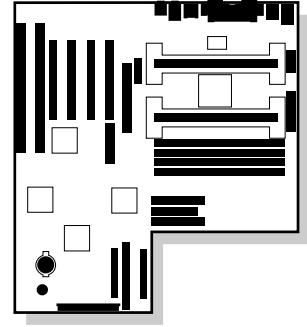


DK440LX Motherboard Product Guide



Order Number: 685890-001

Revision History

| Revision | Revision History | Date |
|----------|---|--------------|
| -001 | First release of the DK440LX Motherboard Product Guide. | October 1997 |

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1 Motherboard Features

This chapter describes the features of the DK440LX motherboard. The remaining chapters explain how to:

- Add or upgrade components like processors or memory
- Use the BIOS Setup program and the *SCSISelect*[†] utility to modify the motherboard's configuration
- Upgrade the BIOS

Figure 1 shows the location of components on the motherboard and Figure 2 shows the details of the back panel connectors.

Microprocessor

The DK440LX motherboard supports 233 MHz, 266 MHz, and 300 MHz Pentium[®] II processors. The motherboard is designed to operate with one or two processors. Processors are not included with the DK440LX motherboard and must be purchased separately.

Each processor is packaged in a Single Edge Contact (S.E.C.) cartridge. The S.E.C. cartridges mount in a dual-processor retention mechanism which is provided with Intel boxed motherboards.

Microprocessor Upgrades

If your motherboard has one processor, you can upgrade the computer by replacing this processor with a faster processor or by installing a second processor. If your motherboard has two processors, you can upgrade the computer by installing two faster processors.

Computers with two processors must have an operating system (such as Windows[†] NT[†] or UNIX[†]) that supports multiple processors.

If you are installing two processors, the following values must be identical for both processors:

- L2 cache size and type (ECC or non-ECC)
- Operating voltages
- Maximum bus and core frequencies

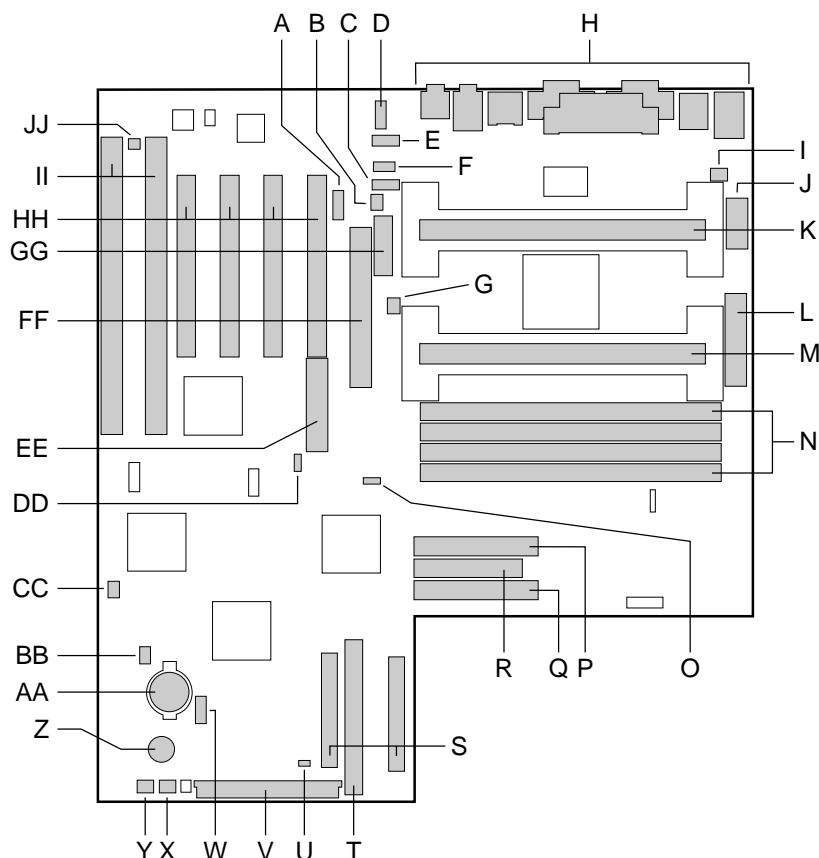
The core stepping value may differ by one step, such as C0 to C1. These values can be determined by checking the parameters of the s-spec number. The s-spec number is a five-character code, for example, SL28R, printed on the top edge of the S.E.C.

For information about s-spec parameters, refer to the Pentium II processor quick reference guide at the Intel developer's web site.



CAUTION

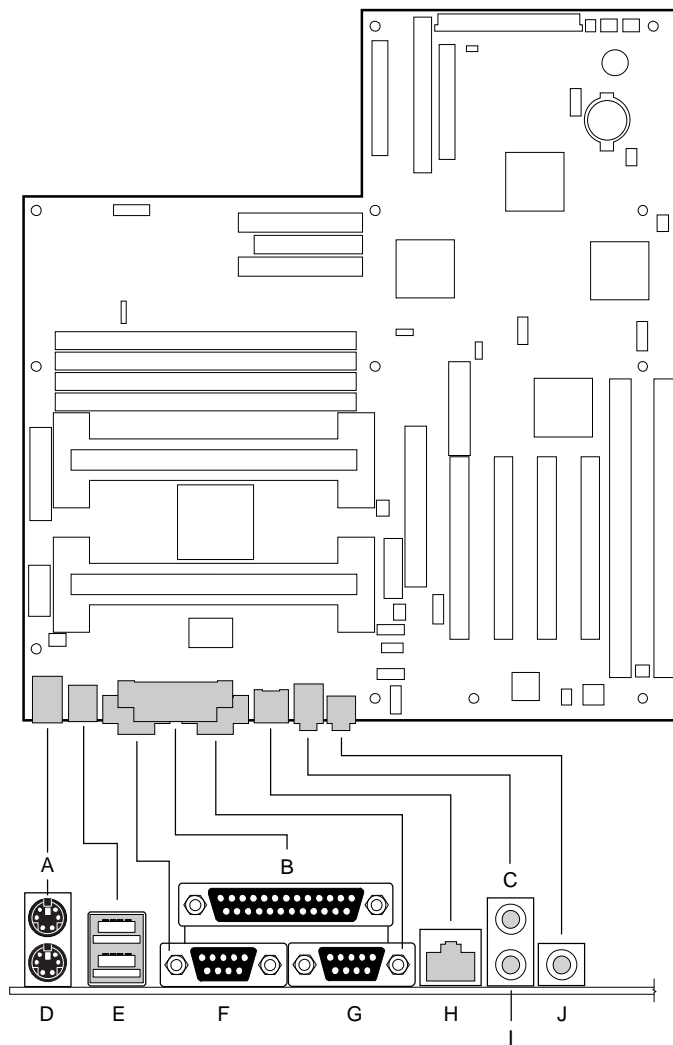
If the operating voltages do not match, the computer will not boot.



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Figure 1. Motherboard Layout

- | | |
|---|--|
| A. Onboard serial port 2 connector (optional) | S. Ultra-wide (16-bit) SCSI connectors |
| B. Rear chassis fan connector | T. Narrow (8-bit) SCSI connector |
| C. ATAPI CD audio connector (optional) | U. Sleep LED connector |
| D. ATAPI-style telephony connector (optional) | V. Front panel I/O connectors |
| E. ATAPI-style Line In connector (optional) | W. HDD LED input connector (4-pin) |
| F. 2 mm CD audio connector (optional) | X. Front chassis 2 fan connector |
| G. CPU 2 fan connector | Y. Front chassis 1 fan connector |
| H. Back panel connectors | Z. Speaker |
| I. CPU 1 fan connector | AA. Battery |
| J. Auxillary power connector | BB. HDD LED input connector (2-pin) |
| K. Boot processor Slot 1 connector | CC. Wake-on-Modem connector |
| L. ATX power connector | DD. Wake on LAN ^{††} connector |
| M. Application processor Slot 1 connector | EE. SCSI PCI Raid ^{port†} connector |
| N. DIMM sockets | FF. A.G.P. connector |
| O. Configuration jumper block | GG. MIDI/Game Port connector (optional) |
| P. Secondary IDE connector | HH. PCI connectors |
| Q. Primary IDE connector | II. ISA connectors |
| R. Floppy drive connector | JJ. Chassis security connector |



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Figure 2. Back Panel Connectors

- A. PS/2[†] connector (mouse or keyboard)
- B. Parallel port connector
- C. Audio Line In jack (optional)
- D. PS/2 connector (mouse or keyboard)
- E. USB connectors
- F. Serial port A connector
- G. Serial port B connector
- H. LAN connector (optional)
- I. Audio Line Out jack (optional)
- J. Audio Mic In jack (optional)

Main Memory

The motherboard has four sockets for installing dual in-line memory modules (DIMMs). The motherboard supports both extended data out (EDO) DRAM and synchronous DRAM (SDRAM). The motherboard can operate with a minimum of 16 megabytes (MB) of memory. Maximum memory size is 512 MB with SDRAM and 1 GB with EDO DRAM. To install memory, see Chapter 2.

Second-level Cache Memory

The second-level cache is located on the substrate of the S.E.C. cartridge. The ECC cache includes burst pipelined synchronous static RAM (BSRAM) and tag RAM. There are four BSRAM components totaling 512 KB in size. Only up to 512 MB of system memory is cacheable.

PCI Enhanced IDE Interface

The PCI enhanced IDE interface handles the exchange of information between the processor and peripheral devices like hard disks and add-in cards inside the computer. The interface supports:

- Up to four IDE devices such as hard drives
- ATAPI devices
- PIO mode 3 and PIO mode 4 devices
- Up to four PCI cards or up to two ISA cards and three PCI cards
- Logical block addressing (LBA) of hard drives larger than 528 MB and extended cylinder head sector (ECHS) translation modes

LS-120 Diskette Support

The motherboard supports LS-120 diskette technology through its IDE interface. LS-120 diskette technology enables users to store 120 MB of data on a single, 3.5-inch removable diskette. LS-120 technology is backward (both read and write) compatible with 1.44 MB and 720 KB DOS-formatted diskettes and is supported by Windows 95 and Windows NT operating systems.

The motherboard allows connection of an LS-120 compatible drive and a standard 3.5-inch diskette drive. If an LS-120 drive is connected to an IDE connector and configured as the A drive and a standard 3.5-inch diskette drive is configured as the B drive, the standard diskette drive must be connected to the diskette drive cable's "A" connector (the connector at the end of the cable). The LS-120 drive can be configured as a boot device in the BIOS Setup program.

Input/Output (I/O) Controller

The I/O controller handles the exchange of information between the processor and external devices like the mouse and keyboard or a printer that are connected to the computer. The controller features the following:

- Integrated keyboard and mouse controller
- Industry standard floppy drive controller
- One multimode bidirectional parallel port
 - Standard mode: Centronics-compatible operation
 - High speed mode: support for enhanced capabilities port (ECP) and enhanced parallel port (EPP)
- Two serial ports
- Flexible IRQ and DMA mapping for Windows 95

Real-Time Clock

The motherboard has a time-of-day clock and 100-year calendar that will rollover to 2000 at the turn of the century. A battery on the motherboard keeps the clock current when the computer is turned off. To set the time on the clock, see Chapter 3.

Universal Serial Bus Support

The motherboard has two Universal Serial Bus (USB) ports. You can connect two USB peripheral devices directly to the computer without an external hub. To attach more than two devices, connect an external hub to either of the built-in ports. The motherboard supports the standard universal host controller interface (UHCI) and takes advantage of standard software drivers written to be compatible with UHCI. The USB features the following:

- Support for hot swapping Plug and Play devices
- Support for self-identifying peripherals
- Support for up to 127 physical devices
- Guaranteed bandwidth and low latencies appropriate for telephony, audio, and other applications

➡ NOTE

Computer systems that have an unshielded cable attached to a USB port may not meet FCC Class B requirements, even if no device or a low-speed USB device is attached to the cable. Use shielded cable that meets the specifications for high-speed USB devices.

Accelerated Graphics Port (A.G.P.) Support

The Accelerated Graphics Port (A.G.P.) is a high-performance interconnect for graphics-intensive applications, such as 3D graphics. A.G.P. is independent of the PCI bus and is intended for exclusive use with graphics displays. A.G.P. provides these features:

- Pipelined-memory read and write operations that hide memory access latency
- Demultiplexing of address and data on the bus for near 100 percent bus efficiency
- AC timing for 133 MHz data transfer rates, allowing data throughput of 533 MB/sec

SCSI Support

The onboard dual-channel SCSI adapter supports 8-bit and 16-bit SCSI devices. Two 68-pin connectors and one 50-pin connector enable you to connect internal SCSI devices. The motherboard BIOS includes the *SCSISelect* Utility which allows you to configure the onboard SCSI adapter and any attached SCSI devices.

The onboard RAIDport connector, in conjunction with an ARO[†]-1130CA-B Adaptec RAIDport add-in card (available from Adaptec, Inc.) and the onboard SCSI controller, provides a complete client RAID solution.

For information on SCSI support, see Chapter 4. If your computer did not come with SCSI software drivers, contact your computer supplier.

Basic Input/Output System (BIOS)

The motherboard's system BIOS is contained in a flash memory device on the motherboard. The BIOS provides the power-on self test (POST), the BIOS Setup program, the PCI and IDE auto-configuration utilities, and the *SCSISelect* Utility.

The BIOS is always shadowed. Shadowing allows BIOS routines to be executed from fast 64-bit onboard DRAM instead of from the slower 8-bit flash memory device.

BIOS Upgrades

Because the BIOS is stored in a flash memory device, you can easily upgrade the BIOS without taking the computer apart. The upgrade process can be done with a software utility on a diskette or hard disk, or over a network. For information on upgrading the BIOS, see Chapter 5.

PCI Auto Configuration

If you install a PCI add-in card in your computer, the PCI auto-configuration utility in the BIOS automatically detects and configures the resources (IRQs, DMA channels, and I/O space) for that add-in card. You do not need to run the BIOS Setup program after you install a PCI add-in card.

However, PCI add-in cards use the same IRQ resources as ISA add-in cards. If you install both a PCI and an ISA add-in card, you must specify the IRQ used by the ISA card. The PCI auto configuration program complies with version 2.1 of the PCI BIOS specification.

IDE Auto Configuration

If you install an IDE device (e.g., a hard drive) in your computer, the IDE auto-configuration utility in the BIOS automatically detects and configures the device for your computer. You do not need to run the BIOS Setup program after installing an IDE device.

ISA Plug and Play Capability

The motherboard provides auto configuration of Plug and Play ISA cards and resource management for legacy (non-Plug and Play) ISA cards when used with the ISA Configuration Utility (ICU) or a Plug and Play compatible operating system like Windows 95. To obtain the ISA Configuration Utility, contact your computer supplier.

Security Passwords

The BIOS includes security features that restrict access to the BIOS Setup program and who can boot the computer. A supervisor password and a user password can be set for the Setup program and for booting the computer, with the following restrictions:

- The supervisor password gives unrestricted access to view and change all the Setup options in the Setup program. This is supervisor mode.
- The user password gives restricted access to view and change Setup options in the Setup program. This is user mode.
- If only the supervisor password is set, pressing the <Enter> key at the password prompt of the Setup program allows the user restricted access to Setup.
- If both the supervisor and user passwords are set, you can enter either the supervisor password or the user password to access Setup. You have access to Setup respective to which password is entered.
- Setting the user password restricts who can boot the computer. The password prompt is displayed before the computer is booted. If only the supervisor password is set, the computer boots without asking for a password. If both passwords are set, you can enter either password to boot the computer.

Add-in Card Slots

The motherboard has six expansion slots for installing add-in cards, like video or network cards, that expand the capabilities of your computer. The expansion slots are as follows:

- One ISA slot
- One shared ISA/PCI slot
- Three PCI slots
- One A.G.P. slot

Hardware Monitor

The hardware monitor subsystem provides the following:

- Integrated temperature and voltage monitoring
- Fan-speed sensors for up to five fans
- Support for the Intel LANDesk® Client Manager software
- Connector for a chassis security feature

Wake on LAN Connector

A two-pin connector is used to implement the Wake on LAN feature when you install an add-in network interface card (NIC) to the computer. Connect the output of a NIC that supports Wake on LAN technology to the onboard Wake on LAN connector. The NIC monitors network traffic and when it detects a Magic Packet[†], it sends a signal through the Wake on LAN connector to wake up the computer. The network can wake up the computer only when it is turned off with its power cord still plugged into the socket.

Battery

A battery on the motherboard keeps the clock and the values in CMOS RAM current when your computer is turned off. To replace the battery, see Chapter 2.

Speaker

A piezoelectric speaker is mounted on the motherboard. The speaker provides audible error code (beep code) information during the POST.

The motherboard also has a front panel connector for an offboard speaker.

Optional Features

This section describes features that are optional on the DK440LX motherboard.

Networking

The optional onboard Ethernet[†] networking subsystem features the EtherExpress[™] PRO/100WfM TX PCI LAN controller. The networking subsystem supports 10Base-T and 100Base-TX protocols. To use the motherboard's networking capability, you will need EtherExpress PRO/100WfM TX PCI LAN software drivers and setup software. If your computer did not come with this software, contact your computer supplier.

Remote wakeup circuitry on the motherboard supports remote wakeup of the computer via Wake on LAN technology. The onboard networking subsystem monitors network traffic. When it detects a Magic Packet, it wakes up the computer. The network can wake up the computer only when it is turned off with its power cord still plugged into the socket. Wake on LAN can be enabled or disabled through the BIOS Setup program.

Audio Subsystem

The optional audio subsystem features the Crystal CS4236B multimedia codec. The CS4236B is a Plug and Play device that provides all the digital audio and analog mixing functions needed to play and record sound on personal computers. The audio subsystem includes the following:

- 16-bit stereo operation
- Sound Blaster Pro[†], Windows Sound System, Roland MPU-401, AdLib[†], and Multimedia PC Level 2 (MPCII) compatibility
- Onboard Crystal CS9236 Wavetable Music Synthesizer (optional)
- Connectors
 - Line In, Line Out, and Mic In back panel audio jacks
 - MIDI/Game port connector
 - CD-ROM audio connectors (ATAPI and 2 mm)
 - Line In connector (ATAPI-style)
 - Telephony connector (ATAPI-style)

Onboard Serial Port B Connector

An optional onboard serial port B connector is available on the motherboard in place of the serial port B connector on the back panel.

Motherboard Features

2 Installing and Replacing Motherboard Components

This chapter describes how to:

- Install and remove the motherboard
- Upgrade the processor(s)
- Install and remove memory
- Replace the battery
- Use the configuration jumper to set processor speed and clear passwords

Before You Begin



CAUTION

Before you install this motherboard in a chassis, see Appendix B for regulatory requirements and precautions.

- Always follow the steps in each procedure in the correct order.
- Set up a log to record information about your computer, such as model, serial numbers, installed options, and configuration information.
- Wear an antistatic wrist strap and place the motherboard on a conductive foam pad when working on it.



WARNINGS

The procedures in this chapter assume that you are familiar with the general terminology associated with personal computers and with the safety practices and regulatory compliance required for using and modifying electronic equipment.

Disconnect the computer from any power source, telecommunications links, networks, or modems before performing any of the procedures described in this chapter. Failure to disconnect power, telecommunications links, networks, or modems before you open the computer chassis or perform any procedures can result in personal injury or equipment damage. Some circuitry on the motherboard can continue to operate even though the front panel power button is off.



CAUTION

Electrostatic discharge (ESD) can damage components. Perform the procedures described in this chapter only at an ESD workstation. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the computer chassis.

How to Install and Remove the Motherboard

Refer to your chassis manual for detailed instructions on installing and removing the motherboard.

⇒ NOTES

You will need a Phillips (#2 bit) screwdriver.

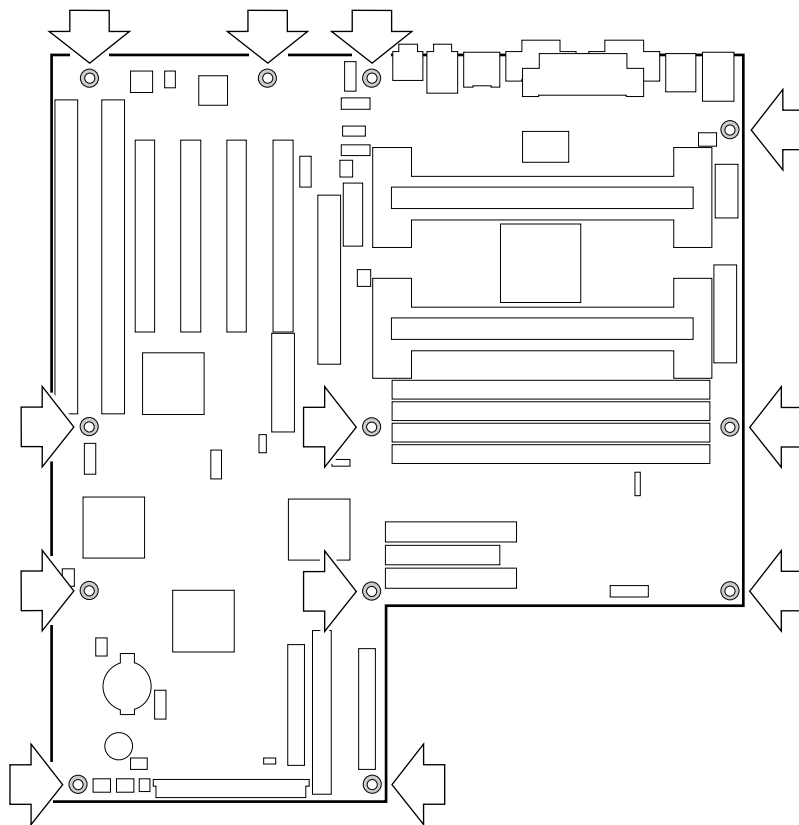
Refer to Appendix B for regulatory requirements and installation instructions and precautions.



WARNING

This procedure should be done only by qualified technical personnel. Disconnect the computer from its power source before doing the procedures described here. Failure to disconnect the power before you open the computer can result in personal injury or equipment damage.

The motherboard is secured to the chassis by 12 screws. Figure 3 shows the locations of the mounting screw holes.



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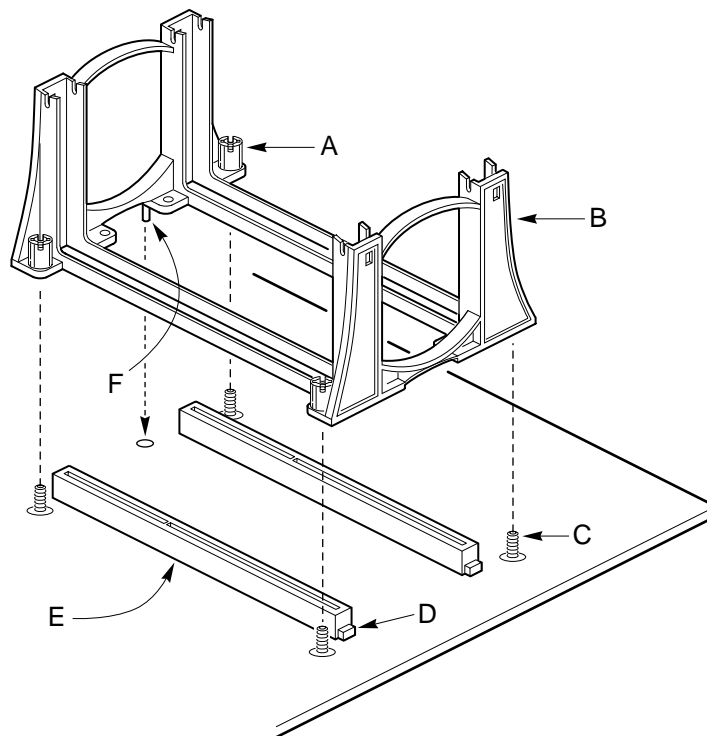
Figure 3. Mounting Screw Holes

How to Install the Processor Retention Mechanism

⇒ NOTE

To install the processor retention mechanism, you need a Phillips (#2 bit) manual torque screwdriver capable of a 6.0 in.-lb. \pm 1.0 in.-lb. (0.678 N-m \pm 0.113 N-m) setting. The screwdriver also must have a shaft longer than 2 inches.

1. Observe the precautions in “Before You Begin” (see page 17).
2. Locate the Slot 1 processor connectors (E) and the four attachment studs (C) shown in Figure 4.



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Figure 4. Installing the Processor Retention Mechanism

3. To position the retention mechanism (B), orient it as shown in Figure 4. The key tab (D) on the Slot 1 connectors fits into notches in the base of the mechanism and the key post (F) on the retention mechanism fits into a hole in the motherboard. When properly seated, the base of the mechanism fits flush with the motherboard.



CAUTION

Overtightening the captive nuts (A) on the retention mechanism can damage the motherboard. Tighten the captive nuts to no more than 6.0 in.-lb. \pm 1.0 in.-lb. (0.678 N-m \pm 0.113 N-m).

4. Finger tighten all four captive nuts to make sure they start correctly on the threads of the attachment studs.
5. To secure the mechanism, tighten the captive nuts with the torque screwdriver to no more than 6.0 in.-lb. \pm 1.0 in.-lb. (0.678 N-m \pm 0.113 N-m).

Processor Upgrades

If your motherboard has one microprocessor, you can upgrade the computer by replacing this processor with a faster processor or by installing an application processor. If your motherboard has two processors, you can upgrade by replacing these processors with two faster processors.

If you have an operating system that supports single processors only (such as Windows 95), see “Upgrading a Single Processor”.

If you have an operating system that supports dual-processing capability (such as Windows NT or UNIX) and you will be running software programs that require additional processing power, see “Upgrading from Single to Dual Processors”.

If your computer has two processors and you want more processing power, see “Upgrading Dual Processors”.

⇒ NOTE

If you install only one processor on a motherboard, it must go in the boot processor Slot 1 connector. In a single-processor configuration, you must install a termination card in the empty application processor Slot 1 connector to ensure proper operation of the computer (see How to Install the Termination Card on page 22). A termination card is included with Intel boxed motherboards.

Upgrading a Single Processor

If you are upgrading a single processor, see the following sections:

1. How to Remove a Processor
2. How to Install a Single Processor
3. How to Set the Processor Speed

Upgrading from Single to Dual Processors

If you are upgrading from single to dual processors, see the following sections:

1. How to Remove the Termination Card
2. How to Install a Second Processor
3. How to Set the Processor Speed

Upgrading Dual Processors

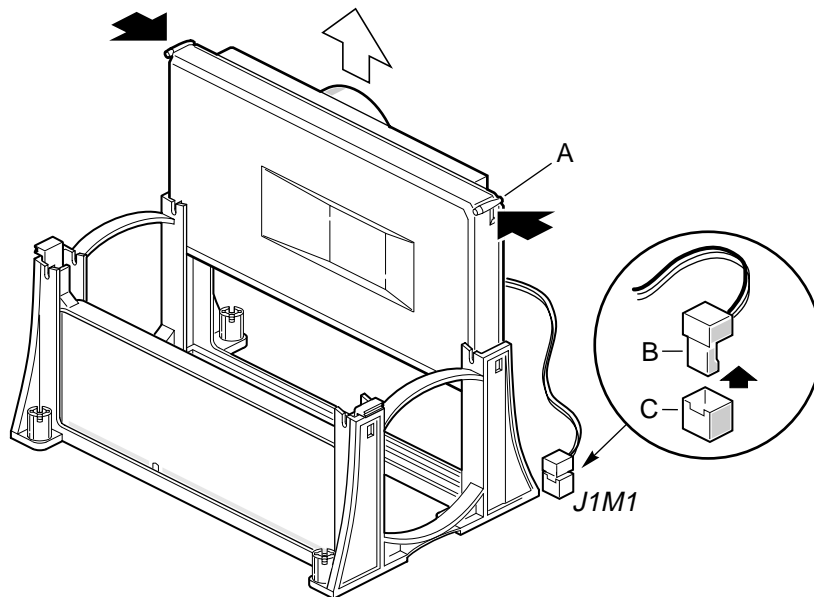
If you are upgrading both processors on the motherboard, see the following sections:

1. How to Remove a Processor
2. How to Install a Single Processor
3. How to Install a Second Processor
4. How to Set the Processor Speed

How to Remove a Processor

To remove the processor (see Figure 5):

1. Observe the precautions in “Before You Begin” (see page 17).
2. Turn off the computer, disconnect the computer’s power cord, and disconnect all external peripherals.
3. Remove any peripherals that block access to the processor.



OM06313

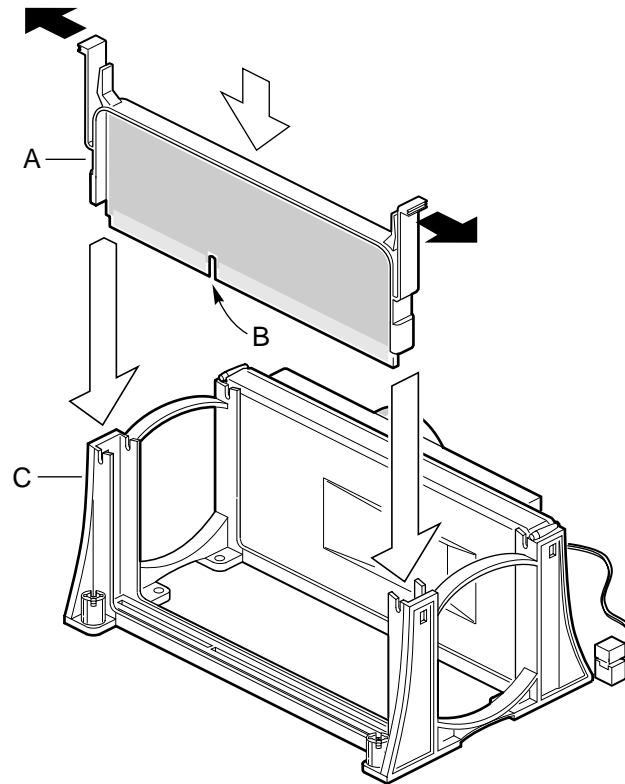
Figure 5. Removing a Processor

4. Remove the fan heat sink power cable connector (B) from the CPU 1 fan connector (C).
5. To remove the processor from the Slot 1 connector, press in on the latches (A) and pull the processor straight up as shown in Figure 5.
6. Store the processor in an antistatic package.

How to Install the Termination Card

To install the termination card (see Figure 6):

1. Observe the precautions in “Before You Begin” (see page 17).
2. Turn off the computer, disconnect the computer’s power cord, and disconnect all external peripherals.
3. Remove any peripherals that block access to the application processor Slot 1 connector.



OM06308

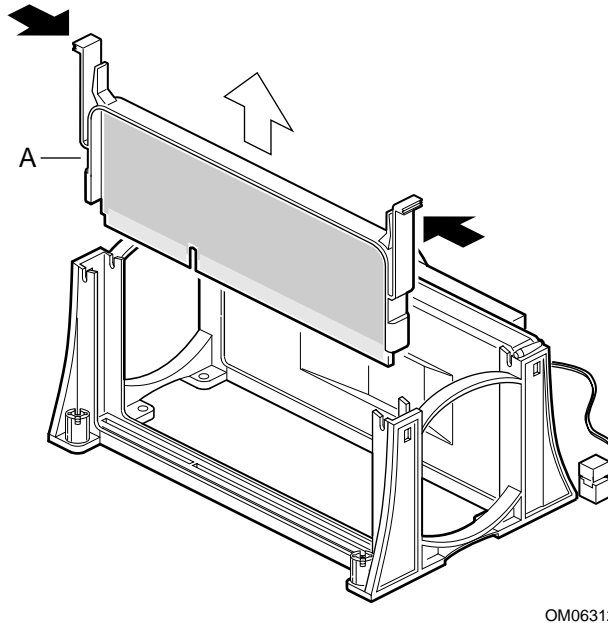
Figure 6. Installing the Termination Card

4. Slide the termination card (A) into the retention mechanism (C). Ensure that the alignment notch (B) in the termination card fits over the key in the application processor Slot 1 connector (see Figure 6).
5. Press down firmly on the termination card until it is seated in the Slot 1 connector and the latches on the termination card lock into place.

How to Remove the Termination Card

To remove the termination card (see Figure 7):

1. Observe the precautions in “Before You Begin” (see page 17).
2. Turn off the computer, disconnect the computer’s power cord, and disconnect all external peripherals.
3. Remove any peripherals that block access to the application processor Slot 1 connector.



OM06312

Figure 7. Removing the Termination Card

4. Press the latches on the termination card (A) inward to release it from the retention mechanism (see Figure 7).
5. Hold the termination card by its top edge and carefully rock it back and forth until the edge connector pulls free from the Slot 1 connector.

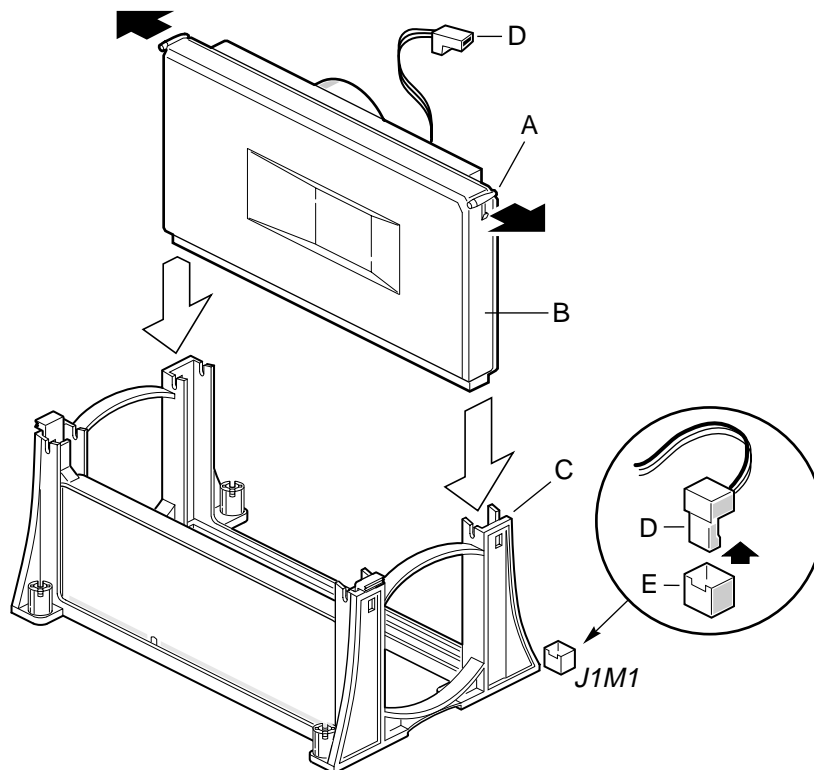
How to Install a Single Processor

⇒ NOTE

When you buy an Intel boxed Pentium II processor to install on the motherboard, heat sink supports are included with the processor. These heat sink supports are not required on the DK440LX motherboard.

To install the processor (see Figure 8):

1. Observe the precautions in “Before You Begin” (see page 17).
2. Turn off the computer, disconnect the computer’s power cord, and disconnect all external peripherals.
3. Remove any peripherals that block access to the boot processor Slot 1 connector.



OM06314

Figure 8. Installing a Single Processor

4. If a processor is installed in the boot processor Slot 1, remove it. See “How to Remove a Processor” on page 21 for instructions.
5. Remove the new processor from its antistatic package.

6. Orient the processor (B) so that the fan heat sink faces the back of the motherboard. Slide the processor into the retention mechanism (C). Ensure that the alignment notch in the S.E.C. cartridge fits over the key in the Slot 1 connector.
7. Press down firmly on the processor until it is seated in the boot processor Slot 1 connector and the latches (A) on the processor lock into place.
8. Attach the small end of the power cable to the fan connector on the S.E.C. cartridge, then attach the large end (D) to the CPU 1 fan connector (E) on the motherboard. The fan connectors are keyed so they will only connect one way.
9. Install a termination card in the application processor Slot 1 connector if one is not already installed. See “How to Install the Termination Card” on page 22 for instructions.
10. Replace any peripherals that were removed in Step 3.
11. Set the processor speed. See “How to Set the Processor Speed” on page 27 for instructions.

How to Install a Second Processor

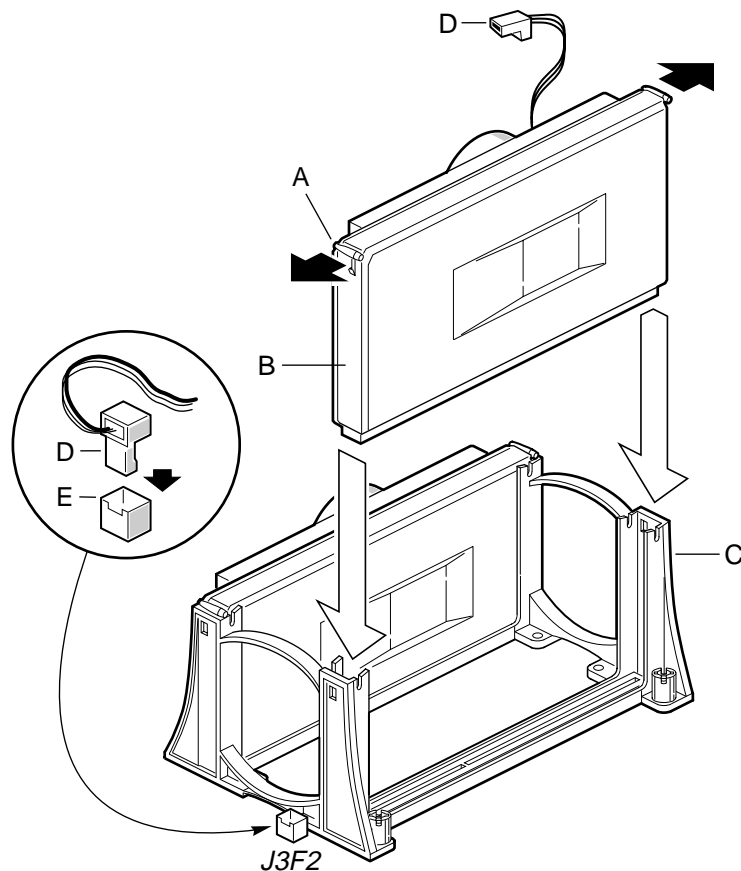
To install the processor (see Figure 9):

1. Observe the precautions in “Before You Begin” (see page 17).
2. Turn off the computer, disconnect the computer’s power cord, and disconnect all external peripherals.

⇒ NOTE

If you are installing two processors, the following values must be identical for both processors: L2 cache size and type (ECC or non-ECC), operating voltages, and bus and core frequencies. The core stepping value may differ by one step, such as C0 to C1. These values can be determined by checking the parameters of the s-spec number. The s-spec number is a five-character code, for example, SL28R, printed on the top edge of the S.E.C. For information about s-spec parameters, refer to the Pentium II processor quick reference guide at the Intel developer’s web site.

3. Remove any peripherals that block access to the application processor Slot 1 connector.



OM06311

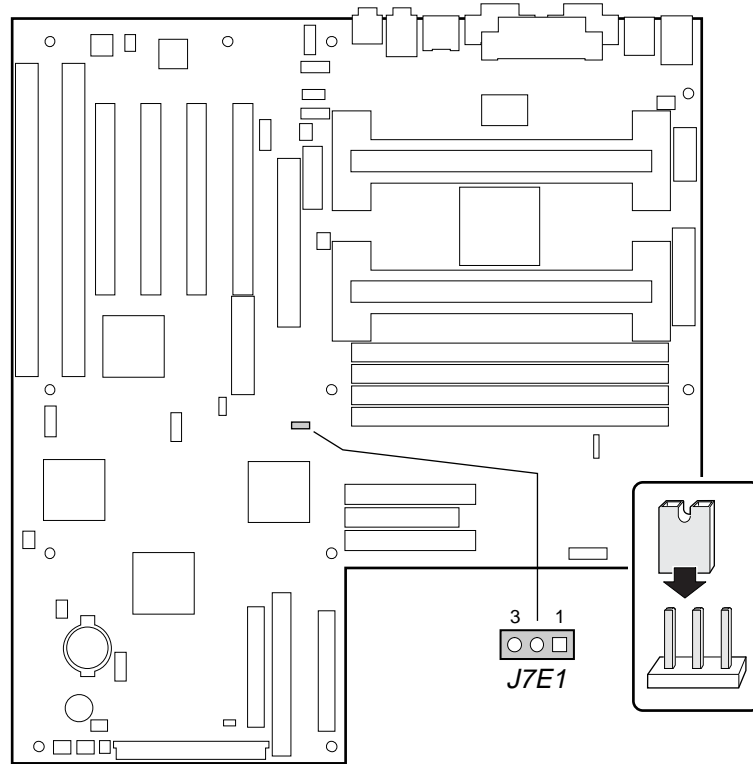
Figure 9. Installing a Second Processor

4. If a termination card is installed in the application processor Slot 1 connector, remove it. See “How to Remove the Termination Card” on page 23.
5. Remove the processor from its antistatic package.
6. Orient the processor (B) so that the fan heat sink faces the back of the motherboard. Slide the processor into the retention mechanism (C). Ensure that the alignment notch in the S.E.C. cartridge fits over the key in the Slot 1 connector.
7. Press down firmly on the processor until it is seated in the application processor Slot 1 connector and the latches (A) on the processor lock into place.
8. Attach the small end of the power cable to the fan connector on the S.E.C. cartridge, then attach the large end (D) to the CPU 2 fan connector (E) on the motherboard. The fan connectors are keyed so they will only connect one way.
9. Replace any peripherals that were removed in Step 3.
10. Set the processor speed. See “How to Set the Processor Speed” on page 27 for instructions.

How to Set the Processor Speed

Set the processor speed after you have installed or upgraded the processor. This procedure assumes that the computer is turned off, the cover is off, and the configuration jumper block (J7E1) has the jumper set on pins 1-2 for normal mode.

1. Observe the precautions in “Before You Begin” (see page 17).
2. Locate the configuration jumper block (see Figure 10).



OM06335

Figure 10. Configuration Jumper Block

3. Move the jumper to pins 2-3 as shown below to set configure mode.



4. Replace the computer cover, turn on the computer, and allow it to boot.
5. The computer starts the Setup program. Setup displays the Maintenance menu.
6. Use the arrow keys to select the Processor Speed feature and press <Enter>. Setup displays a popup screen with the available processor speeds.
7. Use the arrow keys to select the processor speed. For example, select 266 for a 266 MHz Pentium II processor. Press <Enter> to confirm the speed. The Maintenance menu reappears.
8. Press <F10> to save the current values and exit Setup.

9. Turn off the computer.
10. Remove the computer cover.
11. On the jumper block (J7E1), move the jumper back to pins 1-2 to restore normal operation as shown below.



12. Replace the cover and turn on the computer.
13. Verify the processor speed in the startup information displayed by the BIOS.

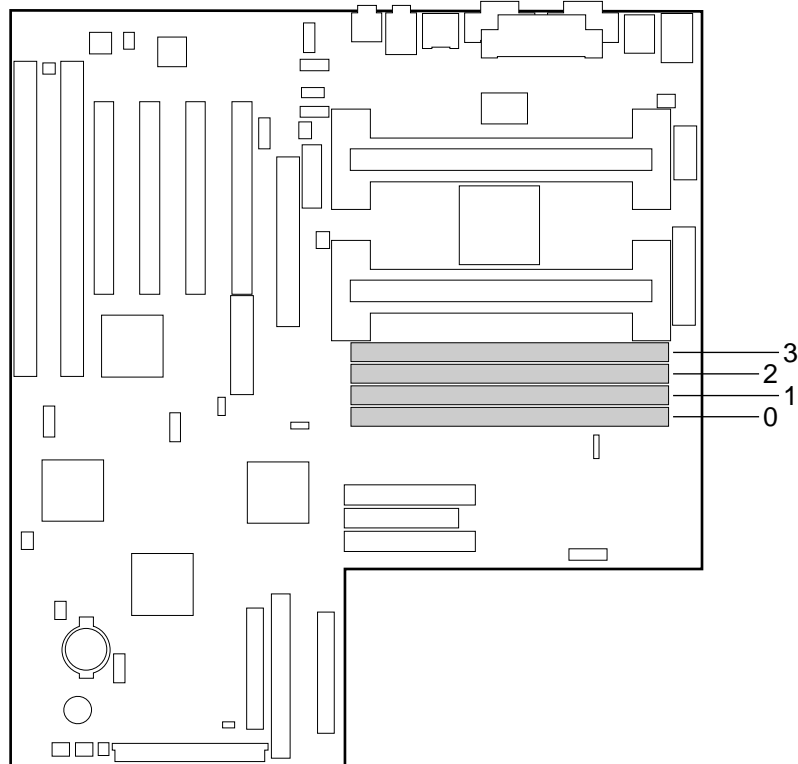
How to Install Memory

You can install from 16 MB to 512 MB of SDRAM or 1 GB of EDO DRAM in the motherboard DIMM sockets. Memory can be installed in one, two, three, or four sockets. DIMM size can vary between sockets. The motherboard supports the following types of memory:

- 168-pin 3.3 V DIMMs with gold-plated contacts
- 66-MHz unbuffered ECC/non-ECC SDRAM
- 60-ns EDO ECC/non-ECC DRAM
- Single- or double-sided DIMMs in the following sizes:

| DIMM Size | Configuration |
|------------------------|-----------------|
| 16 MB | 2 Mbit x 72/64 |
| 32 MB | 4 Mbit x 72/64 |
| 64 MB | 8 Mbit x 72/64 |
| 128 MB | 16 Mbit x 72/64 |
| 256 MB (EDO DRAM only) | 32 Mbit x 72/64 |

Figure 11 shows the location of the DIMM sockets.



OM06326

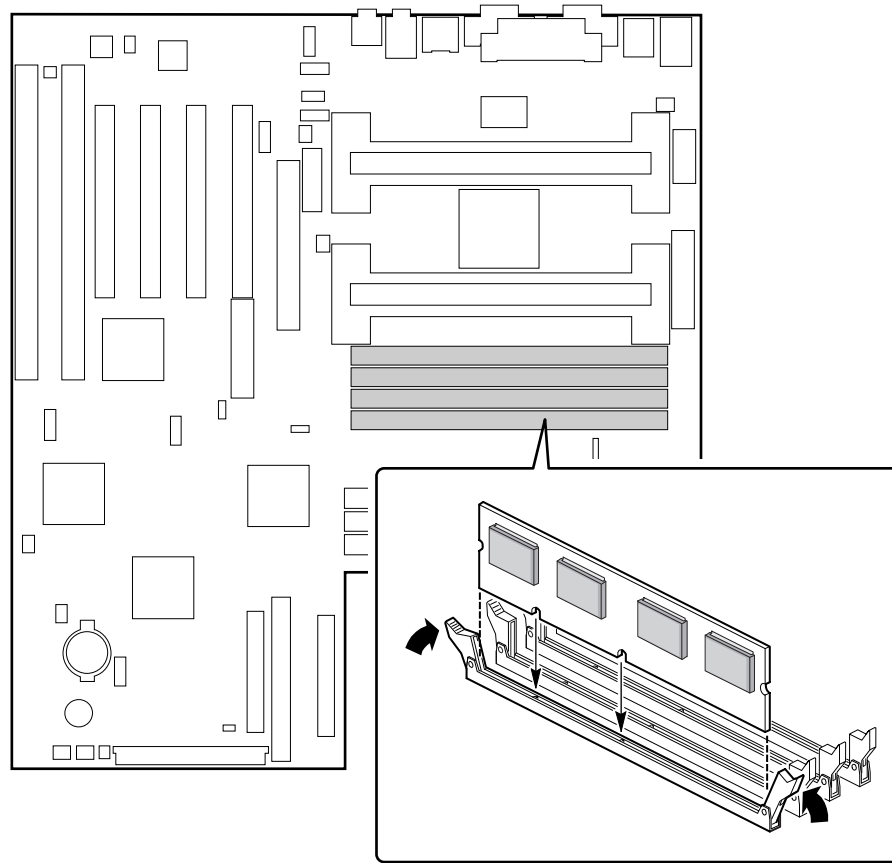
Figure 11. Location of DIMM Sockets

⇒ NOTE

There may be mechanical interference with the DIMM 0 socket and the DIMM 1 socket (see Figure 11) in some combinations of ATX chassis and peripherals (such as CD-ROM drives).

To install DIMMs, follow these steps:

1. Observe the precautions in “Before You Begin” (see page 17).
2. Turn off the computer, disconnect the computer’s power cord, and disconnect all external peripherals.
3. Remove the computer cover and locate the DIMM sockets (see Figure 11).
4. Hold the DIMM by the edges; remove it from its antistatic package.
5. Make sure the clips at either end of the socket are pushed away from the socket.
6. Position the DIMM above the socket. Align the two small notches in the bottom edge of the DIMM with the keys in the socket (see Figure 12).
7. Insert the bottom edge of the DIMM into the socket.
8. When the DIMM is seated, press down on the top edge of the DIMM until the retaining clips at the ends of the socket snap into place. Make sure the clips are firmly in place.
9. Replace the computer cover.



OM06327

Figure 12. Installing a DIMM

How to Remove Memory

To remove a DIMM, follow these steps:

1. Observe the precautions in "Before You Begin" (see page 17).
2. Turn off the computer, disconnect the computer's power cord, and disconnect all external peripherals.
3. Remove the computer cover and locate the DIMM sockets (see Figure 11).
4. Gently spread the retaining clips at each end of the socket. The DIMM pops out of the socket.
5. Hold the DIMM by the edges, lift it away from the socket, and store it in an antistatic package.

How to Replace the Battery

When your computer is turned off, a lithium battery keeps the time-of-day clock and the values in CMOS RAM current.

The battery should last about seven years. When the battery begins to die, it loses voltage; when the voltage drops below a certain level, the Setup program settings stored in CMOS RAM (for example, the date and time) might not be accurate. Replace the battery with an equivalent one.

If your local ordinances permit, you may dispose of individual batteries as normal trash. Do not expose batteries to excessive heat or fire. Keep all batteries away from children.



CAUTION

Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. Discard used batteries according to manufacturer's instructions.



ATTENTION

Il y a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d'un type recommandé par le constructeur. Mettre au rebut les batteries usagées conformément aux instructions du fabricant.



ADVARSEL!

Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.



ADVARSEL

Lithiumbatteri - Eksplosjonsfare. Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandøren.



VARNING

Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

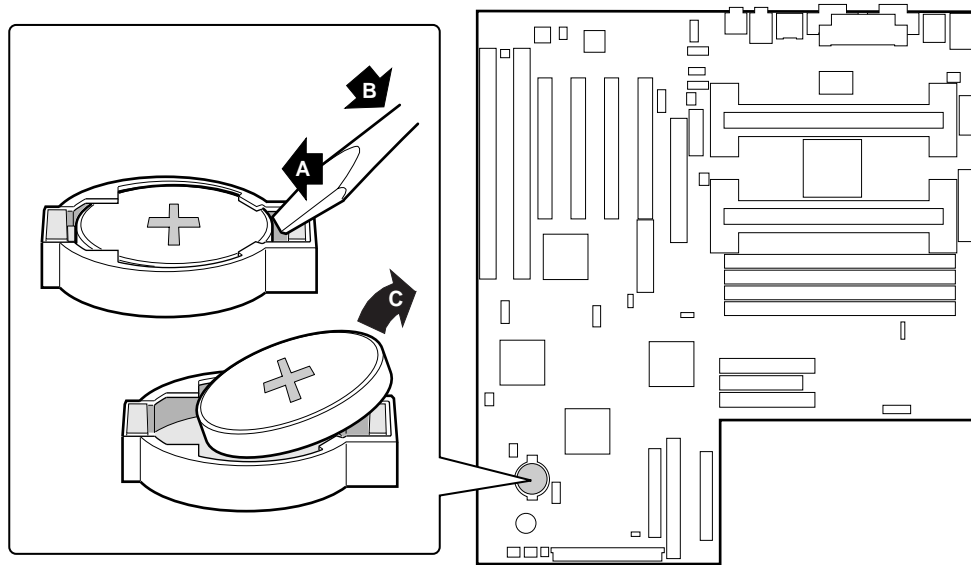


VAROITUS

Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

To replace the battery, follow these steps:

1. Observe the precautions in “Before You Begin” (see page 17).
2. Turn off the computer, disconnect the computer’s power cord, and disconnect all external peripherals.
3. Remove the computer cover.
4. Locate the battery on the motherboard (see Figure 13).
5. With a small flat blade screwdriver (see Figure 13), gently pry the battery free from its socket. Note the orientation of the “+” and “-” on the battery.
6. Install the new battery in the socket, orienting the “+” and “-” correctly.
7. Replace the computer cover.



OM06309

Figure 13. Replacing the Battery

How to Clear Passwords

This procedure assumes that the motherboard is installed in the computer and the configuration jumper block (J7E1) has the jumper set on pins 1-2 for normal mode.

1. Observe the precautions in “Before You Begin” (see page 17).
2. Turn off the computer, disconnect the computer’s power cord, and disconnect all external peripherals.
3. Remove the computer cover.
4. Locate the configuration jumper block (see Figure 10).
5. Move the jumper to pins 2-3 as shown below to set configure mode.



6. Replace the cover, turn on the computer, and allow it to boot.
7. The computer starts the Setup program. Setup displays the Maintenance menu.
8. Use the arrow keys to select Clear Passwords. Press <Enter> and Setup displays a pop-up screen requesting that you confirm clearing the password. Select Yes and press <Enter>. Setup displays the Maintenance menu again.
9. Press <F10> to save the current values and exit Setup.
10. Turn off the computer.
11. Remove the computer cover.
12. On the jumper block (J7E1), move the jumper back to pins 1-2 to restore normal operation as shown below.



13. Replace the computer cover.

3 Using the Setup Program

This chapter provides an overview of the Setup program. You can use the Setup program to change the configuration boot sequence of the computer.

⇒ NOTE

For reference purposes, you should write down the current Setup settings. When you make changes to the settings, update this record.

Setup Program Modes

The Setup program has three modes of operation:

- Normal mode for normal operations
- Configure mode for configuring the processor speed and clearing passwords (see Chapter 2 for instructions on setting processor speed and clearing passwords)
- Recovery mode for recovering the BIOS data

The Setup program operating mode is controlled by the setting of the configuration jumper block J7E1 (see Figure 10). The jumper is usually set to normal mode at the factory.

Table 1 shows jumper settings for the different Setup modes.

Table 1. Jumper Settings for Setup Program Modes

| Mode | Jumper | Description |
|-----------|--------|---|
| Normal | 1-2 | BIOS uses current configuration and passwords for booting. |
| Configure | 2-3 | After the POST runs, Setup starts and displays the Maintenance menu. This menu displays options for setting the processor speed and clearing passwords. |
| Recovery | None | BIOS recovers data from a recovery diskette. Refer to Chapter 5 for information on recovering the BIOS data during an upgrade. |

Setup Menus

To enter the Setup program, turn the computer on and press <F2> when you see the message:

Press <F2> Key if you want to run SETUP

Table 2 is an overview of the menu screens in the Setup program.

Table 2. Setup Menu Bar

| Setup Menu Screen | Description |
|-------------------|--|
| Maintenance | Specifies the processor speed and clears the Setup passwords. This menu is only available in configure mode. |
| Main | Allocates resources for hardware components. |
| Advanced | Specifies advanced features available through the chipset. |
| Security | Specifies passwords and security features. |
| Power | Specifies power management features. |
| Boot | Specifies boot options and power supply controls. |
| Exit | Saves or discards changes to the Setup program options. |

Setup Program Navigation

Table 3 shows the keys you can use to navigate the Setup program menus.

Table 3. Setup Function Keys

| Setup Key | Description |
|------------------------|--|
| <F1> or <Alt-H> | Brings up a help screen for the current item. |
| <Esc> | Exits the menu. |
| <←> or <→> | Selects a different menu screen. |
| <↑> or <↓> | Moves cursor up or down. |
| <Home> or <End> | Moves cursor to top or bottom of the window. |
| <PgUp> or <PgDn> | Moves cursor to top or bottom of the window. |
| <F5> or <-> | Selects the previous value for a field. |
| <F6> or <+> or <Space> | Selects the next value for a field. |
| <F9> | Load the default configuration values for the current menu. |
| <F10> | Save the current values and exit Setup. |
| <Enter> | Executes command or selects the submenu. |
| <+> or <-> | Moves a device or class of devices up or down in the boot order. |

Maintenance Menu

Use this menu to specify the processor speed and clear the Setup passwords. Setup only displays this menu in configure mode.

Table 4. Maintenance Menu

| Feature | Options | Description |
|---------------------|--|---|
| Processor Speed | <ul style="list-style-type: none"> • 200 • 233 • 266 • 300 | Specifies the processor speed in megahertz. |
| Clear All Passwords | No options | Clears the user and supervisor passwords. |

Main Menu

This menu reports processor and memory information. Use it to configure the system date, system time, floppy options, and IDE devices.

Table 5. Main Menu

| Feature | Options | Description |
|-------------------------------|--------------------------|---|
| Processor 0 Type | No options | Displays processor type. |
| Processor 1 Type | No options | Displays processor type. |
| Processor Speed | No options | Displays processor speed. |
| Cache RAM | No options | Displays size of second-level cache. |
| Total Memory | No options | Displays the total amount of RAM on the motherboard. |
| BIOS Version | No options | Displays the version of the BIOS. |
| Language | English (US) | Selects the language used by the BIOS. |
| System Time | Hour, minute, and second | Specifies the current time. |
| System Date | Month, day, and year | Specifies the current date. |
| Floppy Options, submenu | No option | When selected, displays the Floppy Options submenu. |
| Primary IDE Master, submenu | No options | Reports type of connected IDE device. When selected, displays the Primary IDE Master submenu. |
| Primary IDE Slave, submenu | No options | Reports type of connected IDE device. When selected, displays the Primary IDE Slave submenu. |
| Secondary IDE Master, submenu | No options | Reports type of connected IDE device. When selected, displays the Secondary IDE Master submenu. |
| Secondary IDE Slave, submenu | No options | Reports type of connected IDE device. When selected, displays the Secondary IDE Slave submenu. |

Floppy Options Submenu

Use this submenu to configure floppy drives.

Table 6. Floppy Options Submenu


| Feature | Options | Description |
|----------------------|---|---|
| Diskette A: | <ul style="list-style-type: none"> • Disabled • 360 KB, 5¼" • 1.2 MB, 5¼" • 720 KB, 3½" • 1.44/1.25 MB, 3½" (default) • 2.88 MB, 3½" | Specifies the capacity and physical size of diskette drive A. |
| Diskette B: | <ul style="list-style-type: none"> • Disabled (default) • 360 KB, 5¼" • 1.2 MB, 5¼" • 720 KB, 3½" • 1.44/1.25 MB, 3½" • 2.88 MB, 3½" | Specifies the capacity and physical size of diskette drive B. |
| Floppy Write Protect | <ul style="list-style-type: none"> • Disabled (default) • Enabled | Disables or enables write protect for the diskette drive(s). |

IDE Device Configuration Submenus

Use this submenu to configure IDE devices, including:

- Primary IDE master
- Primary IDE slave
- Secondary IDE master
- Secondary IDE slave

Table 7. IDE Device Configuration Submenus

| Feature | Options | Description |
|------------------------|---|--|
| Type | <ul style="list-style-type: none"> • None • ATAPI Removable • CD-ROM • IDE Removable • Auto (default) | <p>Specifies the IDE configuration mode for IDE devices.</p> <p>IDE Removable allows the cylinders, heads, and sectors fields to be changed.</p> <p>Auto automatically fills in the values for the cylinders, heads, and sectors fields.</p> |
| Cylinders | 1 to XXXX | Specifies number of disk cylinders. |
| Heads | 1 to 16 | Specifies number of disk heads. |
| Sectors | 1 to 64 | Specifies number of disk sectors. |
| Maximum Capacity | No options | Reports the maximum capacity for the hard disk. Value calculated from number of cylinders, heads, and sectors. |
| Multi-Sector Transfers | <ul style="list-style-type: none"> • Disabled • 2 Sectors • 4 Sectors • 8 Sectors • 16 Sectors (default) | <p>Specifies number of sectors per block for transfers from the hard drive to memory.</p> <p>Check the hard drive's specifications for optimum setting.</p> |
| LBA Mode Control | <ul style="list-style-type: none"> • Disabled • Enabled (default) | <p>Enables or disables logical block addressing (LBA) in place of the Cylinders, Heads, and Sectors fields.</p> <p> CAUTION <i>Changing the LBA Mode Control after a hard drive has been formatted can corrupt data on the drive.</i></p> |
| Transfer Mode | <ul style="list-style-type: none"> • Standard • Fast PIO 1 • Fast PIO 2 • Fast PIO 3 • Fast PIO 4 • FPIO 3 & Bus Mastering • FPIO 4 & Bus Mastering (default) | Specifies method for transferring data between the hard drive and system memory. |
| Ultra DMA | <ul style="list-style-type: none"> • Disabled (default) • Mode 0 • Mode 1 • Mode 2 | Specifies the ultra DMA mode for the hard drive. |

Advanced Menu

Use this menu to set advanced features that are supported by the motherboard.

Table 8. Advanced Menu

| Feature | Options | Description |
|--|---|--|
| Plug & Play O/S | <ul style="list-style-type: none"> • No (default) • Yes | <p>Specifies if a Plug and Play operating system is being used.</p> <p>No lets the BIOS configure all devices.</p> <p>Yes lets the operating system configure Plug and Play devices. Not required with a Plug and Play operating system.</p> |
| Reset Configuration Data | <ul style="list-style-type: none"> • No (default) • Yes | Clears the BIOS configuration data on the next boot. |
| ECC Configuration | <ul style="list-style-type: none"> • Non-ECC • ECC (default) | Specifies the ECC memory configuration. |
| MPS Version | <ul style="list-style-type: none"> • 1.1 • 1.4 (default) | Configures the MP Specification revision level. Some operating systems may require revision 1.1. |
| Memory Bank 0 Memory Bank 1 Memory Bank 2 Memory Bank 3 | No options | Specifies size and type of DIMM installed. |
| Resource Configuration, submenu | No options | Configures memory blocks and IRQs for legacy ISA devices. When selected, displays the Resource Configuration submenu. |
| Peripheral Configuration, submenu | No options | Configures peripheral ports and devices. When selected, displays the Peripheral Configuration submenu. |
| Keyboard Configuration, submenu | No options | Configures keyboard features. When selected, displays the Keyboard Configuration submenu. |
| Video Configuration, submenu | No options | Configures video features. When selected, displays the Video Configuration submenu. |
| DMI Event Logging, submenu | No options | Configures DMI Events Logging. When selected, displays the DMI Events Logging submenu. |

Resource Configuration Submenu

Use this submenu to configure the memory and interrupts.

Table 9. Resource Configuration Submenu

| Feature | Options | | | Description |
|--------------------|---------------|----------------------------|-------------------------|--|
| Memory Reservation | • C800 - CBFF | Available (default) | Reserved | Reserves specific upper memory blocks for use by legacy ISA devices. Memory hole frees address space in RAM for legacy ISA devices. |
| | • CC00- CFFF | Available (default) | Reserved | |
| | • D000 - D3FF | Available (default) | Reserved | |
| | • D400 - D7FF | Available (default) | Reserved | |
| | • D800 - DBFF | Available (default) | Reserved | |
| | • DC00 - DFFF | Available (default) | Reserved | |
| | • Memory hole | Disabled (default) | Conventional Extended | |
| IRQ Reservation | • IRQ3 | Available (default) | Reserved | Reserves specific IRQs for use by legacy ISA devices. An * (asterisk) displayed next to an IRQ indicates an IRQ conflict. |
| | • IRQ4 | Available (default) | Reserved | |
| | • IRQ5 | Available (default) | Reserved | |
| | • IRQ7 | Available (default) | Reserved | |
| | • IRQ10 | Available (default) | Reserved | |
| | • IRQ11 | Available (default) | Reserved | |

Peripheral Configuration Submenu


Use this submenu to configure the computer peripherals.

Table 10. Peripheral Configuration Submenu

| Feature | Options | Description |
|------------------------|--|---|
| Serial port A | <ul style="list-style-type: none"> Disabled Enabled Auto (default) | <p>Configures serial port A.</p> <p>Auto assigns the first free COM port, normally COM1, the address 3F8h, and the interrupt IRQ4.</p> <p>An * (asterisk) displayed next to an address indicates a conflict with another device.</p> |
| Serial port B | <ul style="list-style-type: none"> Disabled Enabled Auto (default) | <p>Configures serial port B.</p> <p>Auto assigns the first free COM port, normally COM2, the address 2F8h, and the interrupt IRQ3.</p> <p>An * (asterisk) displayed next to an address indicates a conflict with another device.</p> <p>If either serial port address is set, that address will not appear in the list of options for the other serial port.</p> <p>If an <i>ATI mach32[†]</i> or an <i>ATI mach64[†]</i> video controller is active as an add-in card, the COM4, 2E8h address will not appear in the list of options for either serial port.</p> |
| Mode | <ul style="list-style-type: none"> Normal (default) IrDA[†] ASK-IR | Selects the mode for serial port B. |
| Parallel port | <ul style="list-style-type: none"> Disabled Enabled Auto (default) | <p>Configures the parallel port.</p> <p>Auto assigns LPT1 the address 378h and the interrupt IRQ7.</p> <p>An * (asterisk) displayed next to an address indicates a conflict with another device.</p> |
| Mode | <ul style="list-style-type: none"> Output Only Bi-directional (default) EPP ECP (default) | <p>Selects the mode for the parallel port.</p> <p>Output Only operates in AT[†]-compatible mode.</p> <p>Bi-directional operates in bidirectional PS/2-compatible mode.</p> <p>EPP is Extended Parallel Port mode, a high-speed bidirectional mode.</p> <p>ECP is Enhanced Capabilities Port mode, a high-speed bidirectional mode.</p> |
| Floppy disk controller | <ul style="list-style-type: none"> Disabled Enabled (default) | Configures the floppy disk controller. |
| IDE controller | <ul style="list-style-type: none"> Disabled Primary Secondary Both (default) | <p>Configures the IDE controller.</p> <p>Both specifies that both the primary and secondary channels are used.</p> |

continued ➞

Table 10. Peripheral Configuration Submenu (continued)

| Feature | Options | Description |
|-----------------------|--|--|
| Audio | <ul style="list-style-type: none"> Disabled Enabled (default) | Enables or disables the onboard audio subsystem. |
| Hardware Monitor | <ul style="list-style-type: none"> Disabled Enabled (default) | Enables or disables the onboard hardware monitor device. |
| LAN | <ul style="list-style-type: none"> Disabled Enabled (default) | Enables or disables the LAN. |
| SCSI Controller | <ul style="list-style-type: none"> Disabled Enabled (default) | Enables or disables the onboard SCSI controller. |
| Channel B Termination | <ul style="list-style-type: none"> Disabled Enabled (default) | <p>Select Enabled when using 16-bit devices only. Select Disabled when mixing 8- and 16-bit devices.</p> <p> CAUTION Select Enabled if no devices are connected.</p> |

Keyboard Configuration Submenu

Use this submenu to set keyboard features.

Table 11. Keyboard Features Submenu

| Feature | Options | Description |
|----------------------------|---|--|
| Numlock | <ul style="list-style-type: none"> • Auto (default) • On • Off | Specifies the power on state of the Numlock feature on the numeric keypad of the keyboard. |
| Key Click | <ul style="list-style-type: none"> • Disabled (default) • Enabled | Enables the key click option. |
| Keyboard auto-repeat rate | <ul style="list-style-type: none"> • 30/sec (default) • 26.7/sec • 21.8/sec • 18.5/sec • 13.3/sec • 10/sec • 6/sec • 2/sec | Selects the key repeat rate. |
| Keyboard auto-repeat delay | <ul style="list-style-type: none"> • ¼ sec • ½ sec (default) • ¾ sec • 1 sec | Selects the delay before key repeat. |

Video Configuration Submenu

Use this submenu to configure video features.

Table 12. Video Configuration Submenu

| Feature | Options | Description |
|------------------|--|--|
| Palette Snooping | <ul style="list-style-type: none"> • Disabled (default) • Enabled | Controls the ability of a primary PCI graphics controller to share a common palette with an ISA add-in video card. |

DMI Event Logging Submenu

Use this submenu to control DMI event logging.

Table 13. DMI Event Logging Submenu

| Feature | Options | Description |
|--------------------------|--|--|
| Event log capacity | No options | Indicates if there is space available in the event log. |
| Event log validity | No options | Indicates if the contents of the event log are valid. |
| View DMI event log | No options | Enables viewing of DMI event log. |
| Clear all DMI event logs | <ul style="list-style-type: none"> No (default) Yes | Clears the DMI Event Log after rebooting. |
| Event Logging | <ul style="list-style-type: none"> Disabled Enabled (default) | Enables logging of DMI events. |
| ECC Event Logging | <ul style="list-style-type: none"> Disabled (default) Enabled | Enables logging of ECC events. |
| Prompt on POST errors | <ul style="list-style-type: none"> Disabled Enabled (default) | If enabled, the BIOS prompts for input if an error occurs during power up. |
| Mark DMI events as read | No options | Marks all DMI events as read. |

Security Menu

Use this menu to set passwords and security features.

Table 14. Security Menu

| Feature | Options | Description |
|-------------------------|--|---|
| User Password Is | No options | Reports if there is a user password set. |
| Supervisor Password Is | No options | Reports if there is a supervisor password set. |
| Set User Password | Password can be up to seven alphanumeric characters. | Specifies the user password. |
| Set Supervisor Password | Password can be up to seven alphanumeric characters. | Specifies the supervisor password. |
| Clear User Password | No options | Pressing <Enter> clears the user password. |
| User Setup Access | <ul style="list-style-type: none"> Disabled Enabled (default) | Enables or disables user access to the Setup program. |
| Unattended Start | <ul style="list-style-type: none"> Disabled (default) Enabled | Enables the unattended start feature. When enabled, the computer boots, but the keyboard is locked. The user must enter a password to unlock the computer or boot from a floppy diskette. |

Power Menu

Use this menu to set power management features.

Table 15. Power Menu

| Feature | Options | Description |
|-----------------------|--|---|
| Power Management | <ul style="list-style-type: none"> Disabled Enabled (default) | Enables or disables the BIOS power management feature. |
| Inactivity Timer | <ul style="list-style-type: none"> Off (default) 1 Minute 2 Minutes 4 Minutes 6 Minutes 8 Minutes 12 Minutes 16 Minutes | Specifies the amount of time before the computer enters standby mode. |
| Hard Drive | <ul style="list-style-type: none"> Disabled Enabled (default) | Enables power management for hard disks during standby and suspend modes. |
| VESA Video Power Down | <ul style="list-style-type: none"> Disabled Enabled (default) | Enables power management for video during standby and suspend modes. |

Boot Menu

Use this menu to specify the boot features and the boot sequence.

Table 16. Boot Menu

| Feature | Options | Description |
|--|---|--|
| Restore on AC/Power Loss | <ul style="list-style-type: none"> Stay Off Last State (default) Power On | <p>Specifies how the computer responds following a power failure.</p> <p>Stay Off keeps power off until power button pressed.</p> <p>Last State restores previous power state before a power failure.</p> <p>Power On restores power without restoring previous power state.</p> |
| On Modem Ring | <ul style="list-style-type: none"> Stay Off (default) Power On | Specifies how the computer responds to an incoming call on an installed modem when the power is off. |
| On LAN | <ul style="list-style-type: none"> Stay Off Power On (default) | Specifies how the computer responds to a LAN wakeup event when the power is off. |
| On PME | <ul style="list-style-type: none"> Stay Off Power On (default) | Specifies how the computer responds to a PCI power management enable event when the power is off. |
| Quick Boot Mode | <ul style="list-style-type: none"> Enabled Disabled (default) | Enables the computer to boot without running certain POST tests. |
| Scan User Flash Area | <ul style="list-style-type: none"> Enabled Disabled (default) | Enables the BIOS to scan the flash memory for user binary files that are executed at boot time. |
| First Boot Device Second Boot Device Third Boot Device Fourth Boot Device | <ul style="list-style-type: none"> Removable devices Hard Drive ATAPI CD-ROM Drive Network boot | <p>Specifies the boot sequence from the available devices. To specify boot sequence:</p> <ol style="list-style-type: none"> Select the boot device with <↑> or <↓>. Press <+> to move the device up the list or <-> to move the device down the list. <p>The operating system assigns a drive letter to each boot device in the order listed. Changing the order of the devices changes the drive lettering.</p> |
| Hard Drive, submenu | No options | Lists available hard drives. When selected, displays the Hard Drive submenu. |
| Removable Devices, submenu | No options | Lists available removable devices. When selected, displays the Removable Devices submenu. |

Hard Drive Submenu

Use this submenu to configure the boot sequence for hard drives.

Table 17. Hard Drive Submenu

| Options | Description |
|--|---|
| <ul style="list-style-type: none"> Installed hard drive Bootable ISA Cards | <p>Specifies the boot sequence for the hard drives attached to the computer. To specify boot sequence:</p> <ol style="list-style-type: none"> Select the boot device with <↑> or <↓>. Press <+> to move the device up the list or <-> to move the device down the list. <p>The operating system assigns a drive letter to each device in the order listed. Changing the order of the devices changes the drive lettering.</p> |

Removable Devices Submenu

Use this submenu to configure the boot sequence for removable devices.

Table 18. Removable Devices Submenu

| Options | Description |
|--|---|
| <ul style="list-style-type: none"> Installed hard drive Bootable ISA Cards | <p>Specifies the boot sequence for the hard drives attached to the computer. To specify boot sequence:</p> <ol style="list-style-type: none"> Select the boot device with <↑> or <↓>. Press <+> to move the device up the list or <-> to move the device down the list. <p>The operating system assigns a drive letter to each device in the order listed. Changing the order of the devices changes the drive lettering.</p> |

Exit Menu

Use this menu to exit the Setup program, save changes, load defaults, and save defaults.

Table 19. Exit Menu

| Feature | Description |
|-------------------------|--|
| Exit Saving Changes | Exits and saves the changes in CMOS RAM. |
| Exit Discarding Changes | Exits without saving any changes made in Setup. |
| Load Setup Defaults | Loads the default values for all the Setup options. |
| Load Custom Defaults | Loads the custom defaults for Setup options. |
| Save Custom Defaults | Saves the current values as custom defaults. Normally, the BIOS reads the Setup values from flash memory. If this memory is corrupted, the BIOS reads the custom defaults. If no custom defaults are set, the BIOS reads the factory defaults. |
| Discard Changes | Discards changes without exiting Setup. The option values present when the computer was turned on are used. |

4 SCSI Support

This chapter describes the following:

- SCSI devices supported
- How to configure SCSI devices
- How to use the *SCSISelect* Utility

SCSI Device Support

The motherboard has an Adaptec AIC-7895 dual-channel SCSI controller chip integrated as a PCI bus master. The controller supports data path widths of 8-bit (narrow SCSI) at a data transfer rate of up to 20 MB/sec and 16-bit (wide SCSI) at a data transfer rate of up to 40 MB/sec.

The motherboard has three onboard SCSI connectors:

- Channel A has one 68-pin, 16-bit connector
- Channel B has one 68-pin, 16-bit connector and one 50-pin, 8-bit connector

The SCSI cable must meet specific length and connector requirements. To obtain a SCSI cable for your computer, contact your computer supplier.

Termination, Internal SCSI Devices

When attaching internal SCSI devices, a terminated device must be attached to the last connector on the data cable. Other unterminated devices can then be attached to the data cable. See the SCSI device's documentation for instructions on termination. The motherboard is connected to the other end of the cable, and it is terminated by default.

Termination, External SCSI Devices

To connect external devices to the SCSI bus, you must install a SCSI Terminator card. A SCSI Terminator card is included with Intel boxed motherboards. If your motherboard did not come with a SCSI Terminator card, contact your computer supplier.

Mount the SCSI Terminator card in an empty expansion slot on the motherboard. The card does not have an edge connector for plugging into a motherboard expansion connector like typical add-in cards.

After you install the SCSI Terminator card, run the *SCSISelect* utility and turn off the termination on the motherboard. The SCSI Terminator card is terminated by default. If you plug an external device into the card, the card's termination is automatically turned off. Terminate the last external device in the chain. See the SCSI device's documentation for instructions on termination.

RAIDport Connector

The onboard RAIDport connector, in conjunction with an ARO-1130CA-B Adaptec RAIDport card and the SCSI controller, provides a complete client RAID solution. The RAIDport card supports the following features for enhancing performance, data redundancy, and data availability:

- RAID coprocessor
- Data striping (RAID 0)
- Mirroring (RAID 1)
- Hot-swap drive support
- Hot-spare standby
- Dynamic sector repairing

For information on obtaining a RAIDport card, visit Adaptec's web page at <http://www.adaptec.com>.

Using the SCSISelect Utility

The SCSISelect Utility enables you to:

- Modify the SCSI controller's configuration (including termination)
- Change SCSI device settings that conflict with other device settings
- Perform a low-level format on SCSI devices connected to the motherboard

To enter the SCSISelect Utility, boot the computer and press <Ctrl><A> when the following message appears:

```
Press <Ctrl><A> for SCSISelect(TM) Utility!
```

Table 20 provides an overview of the function keys in the SCSISelect Utility. Following Table 20 are descriptions of the options in each screen of the utility.

Table 20. Overview of the SCSISelect Keys

| Press | To |
|-------|---|
| ESC | Go back to previous screen/exit the utility |
| Enter | Select an option |
| ↑ | Move to the previous field |
| ↓ | Move to the next field |
| F5 | Switch between color and monochrome |
| F6 | Reset to defaults |

Main Screen

Before the main screen is displayed, you must select which SCSI channel to configure, A or B. After you select the channel and press <Enter>, the main screen is displayed.

Configure/View Host Adapter Settings

When selected, this brings up the Configuration Menu.

SCSI Disk Utilities

When selected, this brings up the SCSI Disk Utilities Menu.

Configuration Menu

⇒ NOTE

In the utility, an asterisk () indicates the default setting for a field.*

Host Adapter SCSI ID

Specifies the SCSI ID of the host adapter. The options are ID 0–15. The default is ID 7.

SCSI Parity Checking

Enables or disables parity checking. When enabled, the host adapter checks parity when reading from the SCSI bus to verify the correct transmission of data from the SCSI devices. Select disabled if any SCSI devices attached to the chain do not support SCSI parity. The options are:

- **Enabled (default)**
- Disabled

Host Adapter SCSI Termination

Enables or disables SCSI termination on the motherboard. The options are:

- **Enabled (default)**
- Disabled

Boot Device Options

When selected, this brings up the Boot Device Configuration Menu.

SCSI Device Configuration

When selected, this brings up the SCSI Device Configuration Menu.

Advanced Configuration Options

When selected, this brings up the Advanced Configuration Options Menu.

Boot Device Configuration

Boot Channel

Specifies the SCSI channel from which the computer should boot first. The options are:

- **A First (default)**
- B First

Boot SCSI ID

Specifies the SCSI ID of the device from which you wish to boot. The options are ID 0–15. The default is ID 0.

The SCSI ID selected here must correspond to the ID configured on the boot device.

Boot LUN Number

Sets which LUN (Logical Unit Number) to boot from on your boot device if your boot device has multiple LUNs and Multiple LUN Support is enabled. The options are ID 0–7. The default is ID 0.

SCSI Device Configuration Menu

These settings enable you to configure each device on the SCSI bus. You must know the SCSI ID of the device you want to configure.

Initiate Sync Negotiation

When Yes is selected, the motherboard initiates synchronous negotiation with the SCSI device. When No is selected, the motherboard does not initiate synchronous negotiation. If the SCSI device initiates synchronous negotiation, the motherboard always responds. The options are:

- **Yes (default)**
- No

Maximum Sync Transfer Rate

Sets the maximum synchronous data transfer rate in MB/second. The motherboard supports synchronous data transfer rates up to the Ultra Fast SCSI maximum rate of 40 MB/second. The options are:

- **40.0 (default)**
- 32
- 26.8
- 20.0
- 16.0
- 13.4
- 10.0

Enable Disconnection

Sets whether the motherboard allows SCSI devices to disconnect from the SCSI bus. Enabling disconnection allows the motherboard to perform other operations on the SCSI bus while the SCSI device is temporarily disconnected. If two or more SCSI devices are connected to the host adapter, select Yes. The options are:

- **Yes (default)**
- No

Initiate Wide Negotiation

Specifies whether the motherboard attempts 16-bit instead of 8-bit data transfer. Selecting Yes enables Fast/Wide SCSI-2 hard drives to achieve their highest performance. Selecting No specifies 8-bit data transfer unless the SCSI device requests wide negotiation. The options are:

- **Yes (default)**
- No

BIOS Multiple LUN Support

Enables or disables support for booting from a SCSI device that has multiple LUNs. Enable this option if your boot device has multiple LUNs (e.g., multiple partitions on a hard disk). This field is ignored if the Host Adapter BIOS is disabled. The options are:

- Enabled
- **Disabled (default)**

Send Start Unit Command

Specifies whether the Start Unit Command is sent to a SCSI device at boot. Selecting Yes reduces the load on the computer's power supply by allowing the host adapter to start SCSI devices one at a time. Most devices require you to set a jumper on the SCSI device before it can respond to this command. The options are:

- Yes
- **No (default)**

Include in BIOS Scan

Specifies whether a device is included in the SCSI BIOS scan at boot. Selecting No removes the device from the scan. The device will not be assigned a SCSI ID. This option can be useful when changing boot order or if a device has not been responding properly.

The options are:

- **Yes (default)**
- No

Advanced Configuration Options

Plug and Play SCAM Support

Enables or disables support for SCAM Level 1 and Level 2 SCSI devices. SCAM is a method that participating SCSI devices on a bus use to dynamically assign SCSI bus IDs. Some legacy devices cannot reside on a SCSI bus where SCAM protocols execute. Select Disabled if such a device is attached to the SCSI bus.

The options are:

- Enabled
- **Disabled (default)**

Reset SCSI Bus at IC Initialization

Enables or disables support for resetting the SCSI bus when the computer is reset. The options are:

- **Enabled (default)**
- Disabled

Extended BIOS Translation for DOS Drives Larger than 1 GB



CAUTION

All data on all connected hard drives is lost when you change from one setting to another.

Enables or disables extended translation for SCSI hard disks with capacities greater than 1 GB. This field is ignored if the Host Adapter BIOS is disabled. The options are:

- **Enabled (default)**
- Disabled

Use Extended BIOS Translation only with MS-DOS[†] 5.0 or higher. You do not need to enable this option if you are using another operating system such as NetWare[†], OS/2[†], Windows NT, or UNIX.

When you partition a disk larger than 1 GB, use the MS-DOS **fdisk** utility as you normally would. Because the cylinder size increases to 8 MB under extended translation, the partition size you choose must be a multiple of 8 MB. If you request a size that is not a multiple of 8 MB, **fdisk** rounds up to the nearest whole multiple of 8 MB.

Host Adapter BIOS

Enables or disables the host adapter BIOS. If you are booting from a SCSI disk drive connected to the motherboard, the Host Adapter BIOS must be enabled. Disable the Host Adapter BIOS if the peripherals on the SCSI bus (for example, CD-ROM drives) are all controlled by device drivers and do not need the BIOS. The options are:

- **Enabled (default)**
- Disabled

⇒ NOTE

Several of the following fields are ignored if the Host Adapter BIOS is disabled.

Support Removable Disks Under BIOS as Fixed Disks**CAUTION**

If a removable-media SCSI device is controlled by the host adapter BIOS, do not remove the media while the drive is on or you could lose data. If you want to be able to remove media while the drive is on, install your removable-media device driver and set this option to Disabled.

Controls which removable-media drives are supported by the SCSI BIOS. This field is ignored if the Host Adapter BIOS is disabled. The options are:

- **Boot Only (default)** (Only the removable-media drive designated as the boot device is treated as a hard disk drive)
- **All Disks** (All removable-media drives supported by the BIOS are treated as hard disk drives)
- **Disabled** (No removable-media drives are treated as hard disk drives. In this situation, software drivers are needed because the drives are not controlled by the BIOS)

Display <Ctrl-A> Message During BIOS Initialization**NOTE**

This option does not affect your ability to access the SCSISelect Utility. It only toggles the prompt.

Turns on (or off) the "Press <Ctrl> <A> for SCSISelect (TM) Utility!" prompt at boot. This field is ignored if the Host Adapter BIOS is disabled. The options are:

- **Enabled (default)**
- **Disabled**

BIOS Support for Bootable CD-ROM

Enables or disables support for booting from a CD-ROM drive. This field is ignored if the Host Adapter BIOS is disabled. The options are:

- **Enabled (default)**
- **Disabled**

BIOS Support for Int 13 Extensions

Enables or disables support for disks with more than 1024 cylinders. This field is ignored if the Host Adapter BIOS is disabled. The options are:

- **Enabled (default)**
- **Disabled**

Using the SCSI Disk Utilities

To enter the SCSI Disk Utilities, select the SCSI Disk Utilities option from the *SCSISelect* menu. When you select this option, *SCSISelect* scans the SCSI bus (to determine the devices installed) and displays a list of all SCSI IDs and the devices assigned to each ID.

When you select a specific ID and device, a small menu appears, displaying two options: Format Disk and Verify Disk Media.

Format Disk



CAUTION

A low-level format destroys all data on the drive. Back up your data before performing this operation. You cannot abort a low-level format once it is started.

This utility enables you to perform a low-level format on a hard disk drive. Most SCSI disk devices are preformatted at the factory and do not need to be formatted again. The Adaptec Format Disk utility is compatible with most SCSI disk drives.

Verify Disk Media

This utility enables you to scan the media of a hard disk drive for defects. If the utility finds bad blocks on the media, it prompts you to reassign them; if you select Yes, those blocks are no longer used. Press <Esc> at any time to abort the utility.

5 Upgrading the BIOS

This chapter describes how to upgrade the BIOS and how to recover the BIOS if an upgrade fails.

Preparing for the Upgrade

Before you upgrade the BIOS, prepare by:

- Obtaining the BIOS upgrade file
- Recording the current BIOS settings
- Creating a bootable floppy disk
- Creating the BIOS upgrade floppy disk

Obtaining the BIOS Upgrade File

You can upgrade to a new version of the BIOS by using the BIOS upgrade file. The BIOS upgrade file is a compressed self-extracting archive that contains all the files you need to upgrade the BIOS. The BIOS upgrade file contains:

- New BIOS files
- BIOS recovery files
- Intel Flash Memory Update Utility

You can obtain the BIOS upgrade file through your computer supplier or from the Intel World Wide Web site:

<http://www.intel.com>.

⇒ NOTE

Please review the instructions distributed with the update utility before attempting a BIOS upgrade.

The Intel Flash Memory Update Utility allows you to:

- Upgrade the BIOS in flash memory.
- Update the language section of the BIOS.

Recording the Current BIOS Settings

1. Boot the computer and press <F2> when you see the message:

Press <F2> Key if you want to run SETUP

NOTE

Do not skip step 2. You will need these settings to configure your computer at the end of the upgrade procedure.

2. Write down the current settings in the BIOS Setup program.

Creating a Bootable Floppy Disk

⇒ NOTE

If your drive A is an LS-120 diskette drive, you must use a 1.44-MB floppy diskette as the bootable BIOS upgrade floppy disk. The computer is unable to recover a BIOS from an LS-120 diskette.

1. Use a DOS or Windows 95 system to create the floppy disk.
2. Insert a floppy disk in floppy drive A.
3. At the C:\ prompt, for an unformatted floppy disk, type:

```
format a:/s
```

or, for a formatted floppy disk, type:

```
sys a:
```

4. Press <Enter>.

Creating the BIOS Upgrade Floppy Disk

Obtain the BIOS upgrade file as described in “Obtaining the BIOS Upgrade File” and then:

1. Copy the BIOS upgrade file to a temporary directory on your hard disk.
2. From the C:\ prompt, change to the temporary directory.
3. To extract the file, type the name of the BIOS upgrade file, for example:

```
10006BI1.EXE
```

4. Press <Enter>. The extracted file contains the following files:

```
LICENSE.TXT
```

```
BIOINSTR.TXT
```

```
BIOS.EXE
```

5. Read the LICENSE.TXT file, which contains the software license agreement and the BIOINSTR.TXT file, which contains the instructions for the BIOS upgrade.
6. Insert the bootable floppy disk into drive A.
7. To extract the BIOS.EXE file to the floppy disk, change to the temporary directory that holds the BIOS.EXE file and type:

```
BIOS A:
```
8. Press <Enter>.
9. The floppy disk now holds the new BIOS files, the Intel Flash Update Utility, and the recovery files.

Upgrading the BIOS

1. Boot the computer with the BIOS upgrade floppy disk in drive A. The flash memory update utility screen appears.
2. Select Update Flash Memory From a File.
3. Select Update System BIOS. Press <Enter>.
4. Use the arrow keys to select the correct .bio file. Press <Enter>.

5. When the utility asks for confirmation that you want to flash the new BIOS into memory, select `Continue with Programming`. Press `<Enter>`.
6. When the utility displays the message `upgrade is complete`, remove the floppy disk. Press `<Enter>`.
7. As the computer boots, check the BIOS identifier (version number) to make sure the upgrade was successful.
8. To enter the BIOS Setup program, press `<F2>` when you see the message:
 Press `<F2>` Key if you want to run SETUP
9. For proper operation, load the BIOS Setup program defaults. To load the defaults, press `<F9>`.
10. To accept the defaults, press `<Enter>`.
11. Set the options in the BIOS Setup program to the settings you wrote down before the BIOS upgrade.
12. To save the settings, press `<F10>`.
13. To accept the settings, press `<Enter>`.
14. Turn off the computer and reboot.

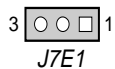
Recovering the BIOS

It is unlikely that anything will interrupt the BIOS upgrade; however, if an interruption occurs, the BIOS could be damaged. The following steps explain how to recover the BIOS if an upgrade fails. The following procedure uses recovery mode for the Setup program. See Chapter 3 for more information on Setup modes.

NOTE

Because of the small amount of code available in the non-erasable boot block area, there is no video support. You will not see anything on the screen during this procedure. Monitor the procedure by listening to the speaker and looking at the floppy drive LED.

1. Turn off the computer, disconnect the computer's power cord, and disconnect all external peripherals.
2. Remove the computer cover and locate the configuration jumper block (see Figure 10).
3. Remove the jumper from all pins as shown below to set recovery mode for Setup.



4. Insert the bootable BIOS upgrade floppy disk into floppy drive A.
5. Replace the computer cover, connect the power cord, turn on the computer, and allow it to boot. The recovery process will take a few minutes.
6. Listen to the speaker.
 - Two beeps and the end of activity in drive A indicate successful BIOS recovery.
 - A series of continuous beeps indicates failed BIOS recovery.
7. If recovery fails, return to step 1 and repeat the recovery process.
8. If recovery is successful, turn off the computer and disconnect its power cord.
9. Remove the computer cover and continue with the following steps.

10. On the jumper block (J7E1), move the jumper back to pins 1-2 as shown below to set normal mode for Setup.



11. Leave the upgrade disk in drive A, replace the computer cover, and connect the computer's power cord.
12. Turn on the computer and continue with the BIOS upgrade (see page 58).

Changing the BIOS Language

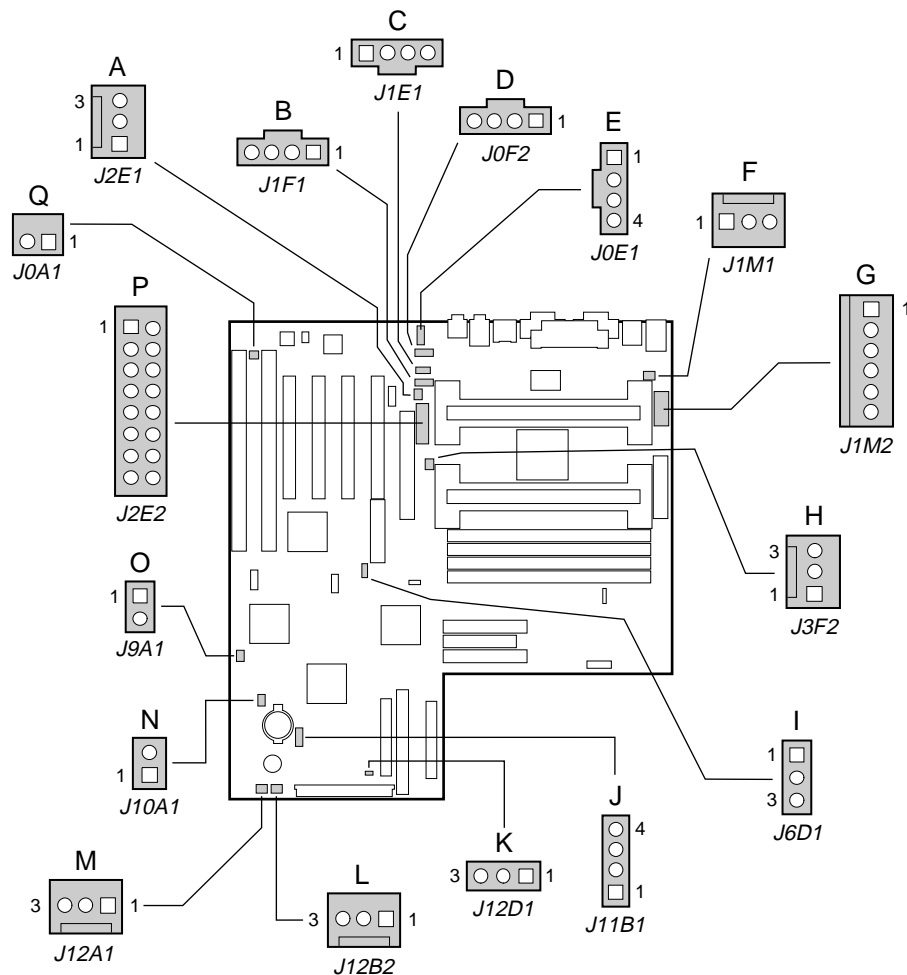
You can use the BIOS upgrade utility to change the language the BIOS uses for messages and the Setup program. Use a bootable floppy disk containing the Intel Flash Memory Update Utility and language files (see “Upgrading the BIOS” on page 58).

1. Boot the computer with the bootable floppy disk in drive A. The BIOS upgrade utility screen appears.
2. Select `Update Flash Memory From a File`.
3. Select `Update Language Set`. Press `<Enter>`.
4. Select drive A and use the arrow keys to select the correct `.lng` file. Press `<Enter>`.
5. When the utility asks for confirmation that you want to flash the new language into memory, select `Continue with Programming`. Press `<Enter>`.
6. When the utility displays the message `upgrade is complete`, remove the floppy disk. Press `<Enter>`.
7. The computer will reboot and the changes will take effect.

6 Technical Reference

Motherboard Connectors

Figure 14 shows the location of the motherboard connectors.



OM06328

Figure 14. Motherboard Connectors

| | | | | | |
|----|------------------|----|---------------------|----|---------------------|
| A. | Rear chassis fan | G. | Auxiliary power | M. | Front chassis 1 fan |
| B. | ATAPI CD audio | H. | CPU 2 fan | N. | HDD LED (2-pin) |
| C. | CD audio (2 mm) | I. | Wake on LAN | O. | Wake-on-Modem |
| D. | Line In | J. | HDD LED (4-pin) | P. | MIDI/Game port |
| E. | Telephony | K. | Sleep LED | Q. | Chassis security |
| F. | CPU 1 fan | L. | Front chassis 2 fan | | |

Table 21. Chassis Security Connector (J0A1)

| Pin | Signal Name |
|-----|----------------|
| 1 | Ground |
| 2 | TAMPER_DETECT# |

Table 22. ATAPI CD Audio Connector (J1F1)

| Pin | Signal Name |
|-----|-------------|
| 1 | Left CD In |
| 2 | CD_common |
| 3 | CD_common |
| 4 | Right CD In |

Table 23. ATAPI-Style Telephony Connector (J0E1)

| Pin | Signal Name |
|-----|--------------------------------|
| 1 | MONO_IN (from external device) |
| 2 | Ground |
| 3 | Ground |
| 4 | TEL_MICIN |

Table 24. ATAPI-Style Line In Connector (J0F2)

| Pin | Signal Name |
|-----|--------------------------|
| 1 | Left Line In |
| 2 | Ground |
| 3 | Ground |
| 4 | Right Line In (monaural) |

Table 25. 2 mm CD Audio Connector (J1E1)

| Pin | Signal Name |
|-----|-------------|
| 1 | Right CD In |
| 2 | CD_common |
| 3 | Left CD In |
| 4 | CD_common |

Table 26. MIDI/Game Port Connector (J2E2)

| Pin | Signal Name |
|-----|-----------------|
| 1 | +5 V (fused) |
| 2 | +5 V (fused) |
| 3 | JAB1 |
| 4 | JABB1 |
| 5 | JACX |
| 6 | JBCX |
| 7 | Ground |
| 8 | MIDI-OUT |
| 9 | Ground |
| 10 | JBCY |
| 11 | JACY |
| 12 | JBB2 |
| 13 | JAB2 |
| 14 | MIDI-IN |
| 15 | +5 V (fused) |
| 16 | MIDI-PRESENT GP |

Table 27. Front Chassis 2 Fan Connector (J12B2)

| Pin | Signal Name |
|-----|-------------|
| 1 | FAN_SEN |
| 2 | +12 V |
| 3 | Ground |

Table 28. CPU 2 Fan Connector (J3F2)

| Pin | Signal Name |
|-----|-------------|
| 1 | FAN_SEN |
| 2 | +12 V |
| 3 | Ground |

Table 29. Rear Chassis Fan Connector (J2E1)

| Pin | Signal Name |
|-----|-------------|
| 1 | FAN_SEN |
| 2 | +12 V |
| 3 | Ground |

Table 30. CPU Fan 1 Connector (J1M1)

| Pin | Signal Name |
|-----|-------------|
| 1 | FAN_SEN |
| 2 | +12 V |
| 3 | Ground |

Table 31. Front Chassis 1 Fan Connector (J12A1)

| Pin | Signal Name |
|-----|-------------|
| 1 | FAN_SEN |
| 2 | +12 V |
| 3 | Ground |

Table 32. Hard Drive LED Input Connector (J10A1)

| Pin | Signal Name |
|-----|-------------|
| 1 | Ground |
| 2 | DRV_ACT# |

Table 33. Hard Drive LED Input Connector (J11B1)

| Pin | Signal Name |
|-----|-------------|
| 1 | Ground |
| 2 | DRV_ACT# |
| 3 | DRV_ACT# |
| 4 | Ground |

Table 34. Wake on LAN Connector (J6D1)

| Pin | Signal Name |
|-----|-------------|
| 1 | +5 VSB |
| 2 | Ground |
| 3 | MP_WAKEUP |

Table 35. Wake-on-Modem Connector (J9A1)

| Pin | Signal Name |
|-----|-------------|
| 1 | SLOT_RI_N |
| 2 | Ground |

Table 36. Auxiliary Power Supply Connector (J1M2)

| Pin | Signal Name |
|-----|-------------|
| 1 | Ground |
| 2 | Ground |
| 3 | Ground |
| 4 | +3.3 V |
| 5 | +3.3 V |
| 6 | +5 V |

Table 37. Sleep LED Header (J12D1)

| Pin | Signal Name |
|-----|--------------|
| 1 | Ground |
| 2 | Yellow/Green |
| 3 | Green/Yellow |

Front Panel Connectors

The motherboard has connectors for controls and indicators typically located on the front panel of the computer. Figure 15 shows the location of the front panel connectors and Table 38 shows the connectors' pinouts.

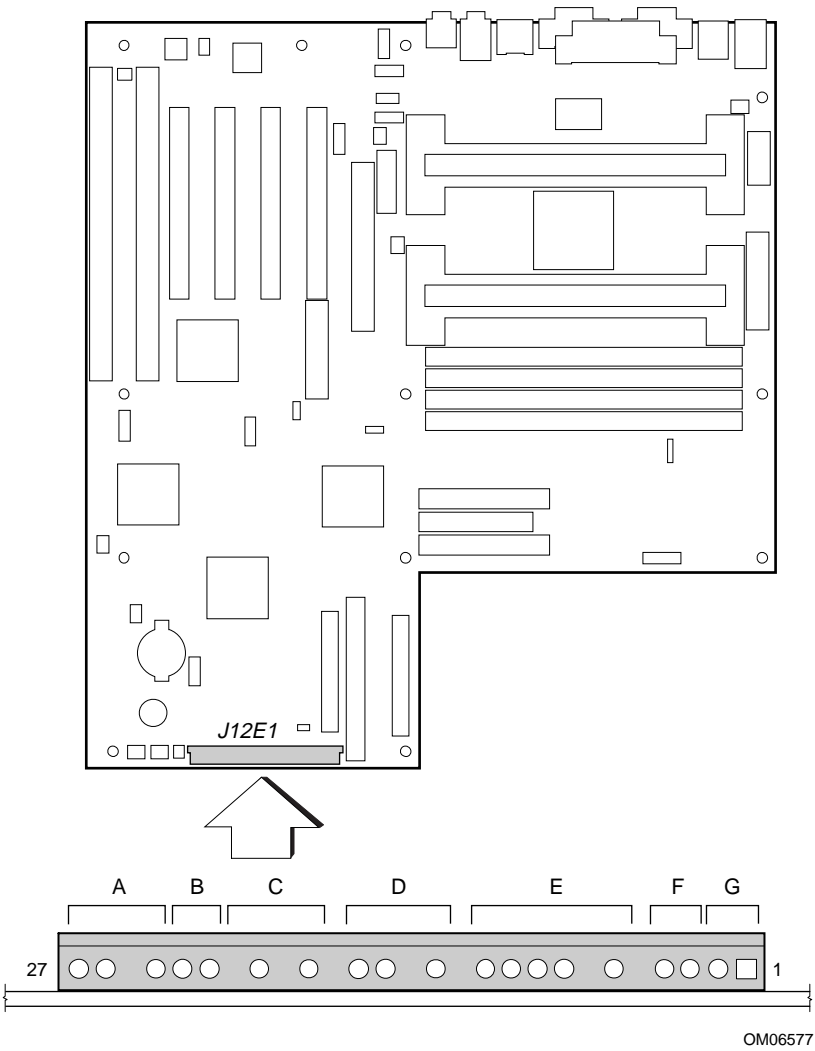


Figure 15. Front Panel Connectors

Table 38. Front Panel Connectors

| Connector | Pin | Signal Name |
|------------------------|-----|-------------------|
| A. Speaker | 27 | SPKR_HDR |
| | 26 | PIEZO_IN |
| | 25 | Key |
| | 24 | Ground |
| B. Reset | 23 | SW_RST |
| | 22 | Ground |
| | 21 | Key |
| C. Power/Sleep LED | 20 | PWR_LED (+5 V) |
| | 19 | Key |
| | 18 | PWR_LED (ground) |
| | 17 | Key |
| D. Hard Drive LED | 16 | HD_PWR (+5 V) |
| | 15 | HD Active# |
| | 14 | Key |
| | 13 | HD_PWR (+5 V) |
| | 12 | Key |
| E. Infrared | 11 | IRLS1 |
| | 10 | Ir TX |
| | 9 | Ground |
| | 8 | Ir RX |
| | 7 | Key |
| | 6 | +5V |
| | 5 | Key |
| F. Sleep/Resume Switch | 4 | SLEEP_PU (pullup) |
| | 3 | SLEEP |
| G. Power On | 2 | Ground |
| | 1 | SW_ON# |

Motherboard Resources

Memory Map

Table 39. Memory Map

| Address Range (decimal) | Address Range (hex) | Size | Description |
|-------------------------|---------------------|---------|---|
| 1024 K - 1048576 K | 100000 - 3FFFFFFF | 1023 MB | Extended memory (EDO memory) |
| 1024 K - 524288 K | 100000 - 1FFFFFFF | 511 MB | Extended memory (SDRAM) |
| 928 K - 1024 K | E8000 - FFFFF | 96 KB | System BIOS |
| 800 K - 928 K | C8000 - E7FFF | 128 KB | Available high DOS memory (open to ISA and PCI bus) |
| 640 K - 800 K | A0000 - C7FFF | 160 KB | Video memory and BIOS |
| 639 K - 640 K | 9FC00 - 9FFFF | 1 KB | Extended BIOS data (movable by memory manager software) |
| 512 K - 639 K | 80000 - 9FBFF | 127 KB | Extended conventional memory |
| 0 K - 512 K | 00000 - 7FFFF | 512 KB | Conventional memory |

DMA Channels

Table 40. DMA Channels

| DMA Channel Number | Data Width | System Resource |
|--------------------|--------------|-------------------------------|
| 0 | 8 or 16 bits | Audio |
| 1 | 8 or 16 bits | Audio/parallel port |
| 2 | 8 or 16 bits | Floppy drive |
| 3 | 8 or 16 bits | Parallel port (for ECP)/audio |
| 4 | | Reserved - cascade channel |
| 5 | 16 bits | Open |
| 6 | 16 bits | Open |
| 7 | 16 bits | Open |

I/O Map

Table 41. I/O Map

| Address (hex) | Size | Description |
|----------------|----------|---|
| 0000 - 000F | 16 bytes | PIIX4 - DMA 1 |
| 0020 - 0021 | 2 bytes | PIIX4 - interrupt controller 1 |
| 002E - 002F | 2 bytes | Super I/O controller configuration registers |
| 0040 - 0043 | 4 bytes | PIIX4 - Counter/Timer 1 |
| 0048 - 004B | 4 bytes | PIIX4- Counter/Timer 2 |
| 0060 | 1 byte | Keyboard Controller Byte - reset IRQ |
| 0061 | 1 byte | PIIX4 - NMI, speaker control |
| 0064 | 1 byte | Keyboard controller, CMD/STAT Byte |
| 0070, bit 7 | 1 bit | PIIX4 - enable NMI |
| 0070, bits 6:0 | 7 bits | PIIX4 - real time clock, address |
| 0071 | 1 byte | PIIX4 - real time clock, data |
| 0078 | 1 byte | Reserved - motherboard configuration |
| 0079 | 1 byte | Reserved - motherboard configuration |
| 0080 - 008F | 16 bytes | PIIX4 - DMA page registers |
| 00A0 - 00A1 | 2 bytes | PIIX4 - interrupt controller 2 |
| 00B2 - 00B3 | 2 bytes | APM control |
| 00C0 - 00DE | 31 bytes | PIIX4 - DMA 2 |
| 00F0 | 1 byte | Reset numeric error |
| 0170 - 0177 | 8 bytes | Secondary IDE channel |
| 01F0 - 01F7 | 8 bytes | Primary IDE channel |
| 0200 - 0207 | 8 bytes | Audio/game port |
| 0220 - 022F | 16 bytes | Audio (Sound Blaster [†] compatible) |
| 0240 - 024F | 16 bytes | Audio (Sound Blaster compatible) |
| 0278 - 027F | 8 bytes | LPT2 |
| 0290 - 0297 | 8 bytes | Hardware monitor |
| 02E8 - 02EF | 8 bytes | COM4/Video (8514A) |
| 02F8 - 02FF | 8 bytes | COM2 |
| 0300 - 0301 | 2 bytes | MPU-401 (MIDI) |
| 0330 - 0331 | 2 bytes | MPU-401 (MIDI) |
| 0332 - 0333 | 2 bytes | MPU-401 (MIDI) |
| 0334 - 0335 | 2 bytes | MPU-401 (MIDI) |
| 0376 | 1 byte | Secondary IDE channel command port |
| 0377 | 1 byte | Floppy channel 2 command |
| 0377, bit 7 | 1 bit | Floppy disk change, channel 2 |
| 0377, bits 6:0 | 7 bits | Secondary IDE channel status port |

continued ➞

Table 41. I/O Map (continued)

| Address (hex) | Size | Description |
|----------------|----------|---------------------------------------|
| 0378 - 037F | 8 bytes | LPT1 |
| 0388 - 038D | 6 bytes | AdLib (FM synthesizer) |
| 03B4 - 03B5 | 2 bytes | Video (VGA [†]) |
| 03BA | 1 byte | Video (VGA) |
| 03BC - 03BF | 4 bytes | LPT3 |
| 03C0 - 03CA | 11 bytes | Video (VGA) |
| 03CC | 1 byte | Video (VGA) |
| 03CE - 03CF | 2 bytes | Video (VGA) |
| 03D4 - 03D5 | 2 bytes | Video (VGA) |
| 03DA | 1 byte | Video (VGA) |
| 03E8 - 03EF | 8 bytes | COM3 |
| 03F0 - 03F5 | 6 bytes | Floppy channel 1 |
| 03F6 | 1 byte | Primary IDE channel command port |
| 03F7 (Write) | 1 byte | Floppy channel 1 command |
| 03F7, bit 7 | 1 bit | Floppy disk change channel 1 |
| 03F7, bits 6:0 | 7 bits | Primary IDE channel status port |
| 03F8 - 03FF | 8 bytes | COM1 |
| 04D0 - 04D1 | 2 bytes | Edge/level triggered PIC |
| 0530 - 0537 | 8 bytes | Windows Sound System |
| 0604 - 060B | 8 bytes | Windows Sound System |
| LPT n + 400h | 8 bytes | ECP port, LPT n base address + 400h |
| 0CF8 - 0CFB* | 4 bytes | PCI configuration address register |
| 0CF9** | 1 byte | Turbo and reset control register |
| 0CFC - 0CFF | 4 bytes | PCI configuration data register |
| 0E80 - 0E87 | 8 bytes | Windows Sound System |
| 0F40 - 0F47 | 8 bytes | Windows Sound System |
| 0FF0 - 0FF7 | 8 bytes | CS4236B audio control |
| FF00 - FF07 | 8 bytes | IDE bus master register |
| FFA0 - FFA7 | 8 bytes | Primary bus master IDE registers |
| FFA8 - FFAF | 8 bytes | Secondary bus master IDE registers |
| 007C, bits 5:4 | 2 bits | Chassis fan RPM sense selection |

* DWORD access only

** Byte access only

➡ NOTE

This table does not list I/O addresses that may be used by add-in cards in the system.

PCI Configuration Space Map

Table 42. PCI Configuration Space Map

| Bus Number (hex) | Device Number (hex) | Function Number (hex) | Description |
|------------------|---------------------|-----------------------|---|
| 00 | 00 | 00 | Intel 82443LX (PAC) |
| 01 | 00 | 00 | Intel 82371AB (PAC) A.G.P. bus |
| 00 | 02 | 00 | Intel 82371AB (PIIX4) PCI/ISA bridge |
| 00 | 02 | 01 | Intel 82371AB (PIIX4) IDE bus master |
| 00 | 02 | 02 | Intel 82371AB (PIIX4) USB |
| 00 | 02 | 03 | Intel 82371AB (PIIX4) power management |
| 00 | 03 | 00 | Ethernet |
| 00 | 09 | 00 | SCSI |
| 00 | 0D | 00 | PCI expansion slot 1 (J1D2) |
| 00 | 0E | 00 | PCI expansion slot 2 (J1D1) |
| 00 | 0F | 00 | PCI expansion slot 3 (J1C1) |
| 00 | 10 | 00 | PCI expansion slot 4 (J1B1) |

Interrupts

Table 43. Interrupts

| IRQ | System Resource |
|-----|--|
| NMI | I/O channel check |
| 0 | Reserved, interval timer |
| 1 | Reserved, keyboard buffer full |
| 2 | Reserved, cascade interrupt from slave PIC |
| 3 | COM2* |
| 4 | COM1* |
| 5 | LPT2 (Plug and Play option)/audio/user available |
| 6 | Floppy drive |
| 7 | LPT1* |
| 8 | Real time clock |
| 9 | Reserved |
| 10 | Windows Sound System* |
| 11 | User available |
| 12 | Onboard mouse port (if present, else user available) |
| 13 | Reserved, math coprocessor |
| 14 | Primary IDE (if present, else user available) |
| 15 | Secondary IDE (if present, else user available) |

* Default, but can be changed to another IRQ

A Error Messages

BIOS Beep Codes

One long beep followed by several short beeps indicates a video problem.

Table 44. Beep Codes

| Beeps | 80h Code | Description |
|---------|----------|---|
| 1 | B4h | One short beep before boot |
| 1-2 | 98h | Search for option ROMs |
| 1-2-2-3 | 16h | BIOS ROM checksum |
| 1-3-1-1 | 20h | Test DRAM refresh |
| 1-3-1-3 | 22h | Test keyboard controller |
| 1-3-4-1 | 2Ch | RAM failure on address line <i>nnnn</i> |
| 1-3-4-3 | 2Eh | RAM failure on data bits <i>nnnn</i> of low byte of memory bus |
| 1-4-1-1 | 30h | RAM failure on data bits <i>nnnn</i> of high byte of memory bus |
| 2-1-2-3 | 46h | Check ROM copyright notice |
| 2-2-3-1 | 58h | Test for unexpected interrupts |

nnnn = hexadecimal number

BIOS Error Messages

Table 45. BIOS Error Messages

| Error Message | Explanation |
|---|---|
| Diskette drive A error or Diskette drive B error | Drive A or B is present but fails the POST diskette tests. Check that the drive is defined with the proper diskette type in Setup and that the diskette drive is installed correctly. |
| Extended RAM Failed at offset: <i>nnnn</i> | Extended memory not working or not configured properly at offset <i>nnnn</i> . |
| Failing Bits: <i>nnnn</i> | The number <i>nnnn</i> is a map of the bits at the RAM address (System, Extended, or Shadow memory) that failed the memory test. Each 1 in the map indicates a failed bit. |
| Fixed Disk 0 Failure or Fixed Disk 1 Failure or Fixed Disk Controller Failure | A fixed disk is not working or not configured properly. Check to see if the fixed disk is installed properly. Run Setup to be sure the fixed-disk type is correctly identified. |
| Incorrect Drive A type - run SETUP | Type of diskette drive for drive A not correctly identified in Setup. |

continued ➞

Table 45. BIOS Error Messages (continued)

| Error Message | Explanation |
|--|--|
| Invalid NVRAM media type | Problem with NVRAM (CMOS) access. |
| Keyboard controller error | The keyboard controller failed test. Try replacing the keyboard. |
| Keyboard error | Keyboard not working. |
| Keyboard error <i>nn</i> | BIOS discovered a stuck key and displays the scan code <i>nn</i> for the stuck key. |
| Keyboard locked - Unlock key switch | Unlock the system to proceed. |
| Monitor type does not match CMOS - Run SETUP | Monitor type not correctly identified in Setup. |
| Operating system not found | Operating system cannot be located on either drive A or drive C. Enter Setup and see if fixed disk and drive A are properly identified. |
| Parity Check 1 | Parity error found in the system bus. The BIOS attempts to locate the address and display it on the screen. If the BIOS cannot locate the address, it displays ????. |
| Parity Check 2 | Parity error found in the I/O bus. BIOS attempts to locate the address and display it on the screen. If it cannot locate the address, it displays ????. |
| Press <F1> to resume, <F2> to Setup | Displayed after any recoverable error message. Press <F1> to start the boot process or <F2> to enter Setup and change any settings. |
| Real time clock error | Real-time clock failed the BIOS test. May require motherboard repair. |
| Shadow RAM Failed at offset: <i>nnnn</i> | Shadow RAM failed at offset <i>nnnn</i> of the 64 KB block at which the error was detected. |
| System battery is dead - Replace and run SETUP | The CMOS clock battery indicator shows the battery is dead. Replace the battery and run Setup to reconfigure the system. |
| System cache error - Cache disabled | RAM cache failed the BIOS test. BIOS disabled the cache. |
| System CMOS checksum bad - run SETUP | System CMOS RAM has been corrupted or modified incorrectly, perhaps by an application program that changes data stored in CMOS. Run Setup and reconfigure the system either by getting the default values and/or making your own selections. |
| System RAM Failed at offset: <i>nnnn</i> | System RAM failed at offset <i>nnnn</i> of the 64 KB block at which the error was detected. |
| System timer error | The timer test failed. Requires repair of system motherboard. |

nnnn = hexadecimal number

B Regulatory and Integration Information

This appendix contains:

- Safety standards, electromagnetic compatibility regulations, and product certification markings for this motherboard
- Instructions and precautions for integrators who are installing this motherboard in a chassis

Regulatory Requirements

This printed circuit assembly meets the following safety and electromagnetic compatibility (EMC) regulations when correctly installed in a compatible host computer.

Safety Standards

UL 1950 - CSA 950-95, 3rd edition, 28 July 1995

The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (USA and Canada)

EN 60 950, 2nd Edition, 1992 (with Amendments 1-4)

The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (European Union)

IEC 950, 2nd edition, 1991 (with Amendments 1-4)

The Standard for Safety of Information Technology Equipment including Electrical Business Equipment. (International)

EMKO-TSE (74-SEC) 207/94

Summary of Nordic deviations to EN 60 950. (Norway, Sweden, Denmark, and Finland)

Electromagnetic Compatibility (EMC) Regulations

CFR 47, Parts 2 and 15

Title 47, Code of Federal Regulations; General Rules and Regulations, Radio Frequency Devices. Product compliance is verified using limits from CISPR 22 (frequencies to 1 GHz) and FCC Rules, Section 15.109(a) (frequencies above 1 GHz) and test criteria as defined in ANSI C63.4 and FCC Rules, Section 15.32(a).

CISPR 22/EN 55 022, Dated 1993/1995, Class B

Limits and methods of measurement of Radio Interference Characteristics of Information Technology Equipment. (International)

EN 55 022, 1995

Limits and methods of measurement of Radio Interference Characteristics of Information Technology Equipment. (Europe)

EN 50 082-1, 1992

Generic Immunity Standard. Currently compliance is determined via testing to IEC 801-2, -3 and -4. (Europe)

VCCI Class 2 (ITE)

Implementation Regulations for Voluntary Control of Radio Interference by Data Processing Equipment and Electronic Office Machines. (Japan)

ICES-003, Issue 2

Interference-Causing Equipment Standard, Digital Apparatus. (Canada)

Product Certification Markings

This printed circuit assembly has the following product certification markings:

- European CE Mark
 - Marking on the board and the shipping container.
- UL Recognition Mark
 - Marking is the UL File No. E139761 on the component side of the board and the PB No. on the solder side of the board. Board material flammability is 94V-1 or -0.
- Canadian Compliance Mark
 - Marking is a small c followed by a stylized backward UR on the component side of the board.
- FCC Compliance Mark
 - Marking consists of Declaration of Conformity label on the component side of the motherboard.

Installation Precautions

When you install and test the motherboard, observe all warnings and cautions in the installation instructions.

To avoid injury, be careful of:

- Sharp pins on connectors
- Sharp pins on printed circuit assemblies
- Rough edges and sharp corners on the chassis
- Hot components (like processors, voltage regulators, and heat sinks)
- Damage to wires that could cause a short circuit

Observe all warnings and cautions that instruct you to refer computer servicing to qualified technical personnel.



WARNING

Do not open the power supply. Risk of electric shock and burns from high voltage and rapid overheating. Refer servicing of the power supply to qualified technical personnel.

Installation Instructions



CAUTION

Follow these guidelines to meet safety and regulatory requirements when installing this board assembly.

Read and adhere to all of these instructions and the instructions supplied with the host computer and associated modules. If the instructions for the host computer are inconsistent with these instructions or the instructions for associated modules, contact the supplier's technical support to find out how you can ensure that your computer meets safety and regulatory requirements. If you do not follow these instructions and the instructions provided by host computer and module suppliers, you increase safety risk and the possibility of noncompliance with regional laws and regulations.

Ensure Electromagnetic Compatibility (EMC)

Before computer integration, make sure that the host chassis, power supply, and other modules have passed EMC testing using a motherboard with a microprocessor from the same family (or higher) and operating at the same (or higher) speed as the microprocessor on this motherboard.

In the installation instructions for the host chassis, power supply, and other modules pay close attention to the following:

- Certifications (see page 78)
- External I/O cable shielding and filtering
- Mounting, grounding, and bonding requirements
- Keying of connectors when mismatching of connectors could be hazardous

If the host chassis, power supply, and other modules have not passed applicable EMC testing before integration, EMC testing must be conducted on a representative sample of the newly completed computer.

Ensure Host Computer and Accessory Module Certifications

Make sure that the host computer, any added subassembly, such as a board or drive assembly, and internal or external wiring, are certified for the region(s) where the end-product will be used. Marks on the product are proof of certification. Certification marks are as follows:

In Europe

The CE marking signifies compliance with all relevant European requirements. If the host computer does not bear the CE marking, obtain a supplier's Declaration of Conformity to the appropriate standards required by the European EMC Directive and Low Voltage Directive. Other directives, such as the Machinery and Telecommunications Directives, may also apply depending on the type of product. No regulatory assessment is necessary for low voltage DC wiring used internally or wiring used externally when provided with appropriate overcurrent protection. Appropriate protection is provided by a maximum 8-Amp current limiting circuit or a maximum 5-Amp fuse or positive temperature coefficient (PTC) resistor. All Intel motherboards now have PTCs on all external ports that provide DC power externally.

In the United States

A certification mark by a Nationally Recognized Testing Laboratory (NRTL) such as UL, CSA, or ETL signifies compliance with safety requirements. External wiring must be UL Listed and suitable for the intended use. Internal wiring must be UL Listed or Recognized and rated for applicable voltages and temperatures. The FCC mark (Class A for commercial or industrial only or Class B for residential) signifies compliance with electromagnetic interference requirements.

In Canada

A nationally recognized certification mark such as CSA or cUL signifies compliance with safety requirements. No regulatory assessment is necessary for low voltage DC wiring used internally or wiring used externally when provided with appropriate overcurrent protection. Appropriate protection is provided by a maximum 8-Amp current limiting circuit or a maximum 5-Amp fuse or positive temperature coefficient (PTC) resistor. All Intel motherboards now have PTCs on all external ports that provide DC power externally.

Prevent Power Supply Overload

Unless the power supply has inherent overcurrent protection, do not overload the power supply output. To avoid overloading the power supply, make sure that the calculated total current load of all the modules within the computer is less than the output current rating of the power supply. If you do not do this, the power supply could overheat, catch fire, or damage the insulation that separates hazardous AC line circuitry from low-voltage user accessible circuitry. If the load drawn by a module cannot be determined by the markings and instructions supplied with the module, contact the module supplier's technical support.

Place Battery Marking on the Computer

There is insufficient space on this motherboard to provide instructions for replacing and disposing of the battery. The following warning must be placed permanently and legibly on the host computer as near as possible to the battery.



WARNING

Danger of explosion if battery is incorrectly replaced.

Replace with only the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Use Only for Intended Applications

This product was evaluated for use in computers that will be installed in offices, homes, schools, computer rooms, and similar locations. The suitability of this product for other applications, (such as medical, industrial, alarm systems, and test equipment) may require further evaluation.

